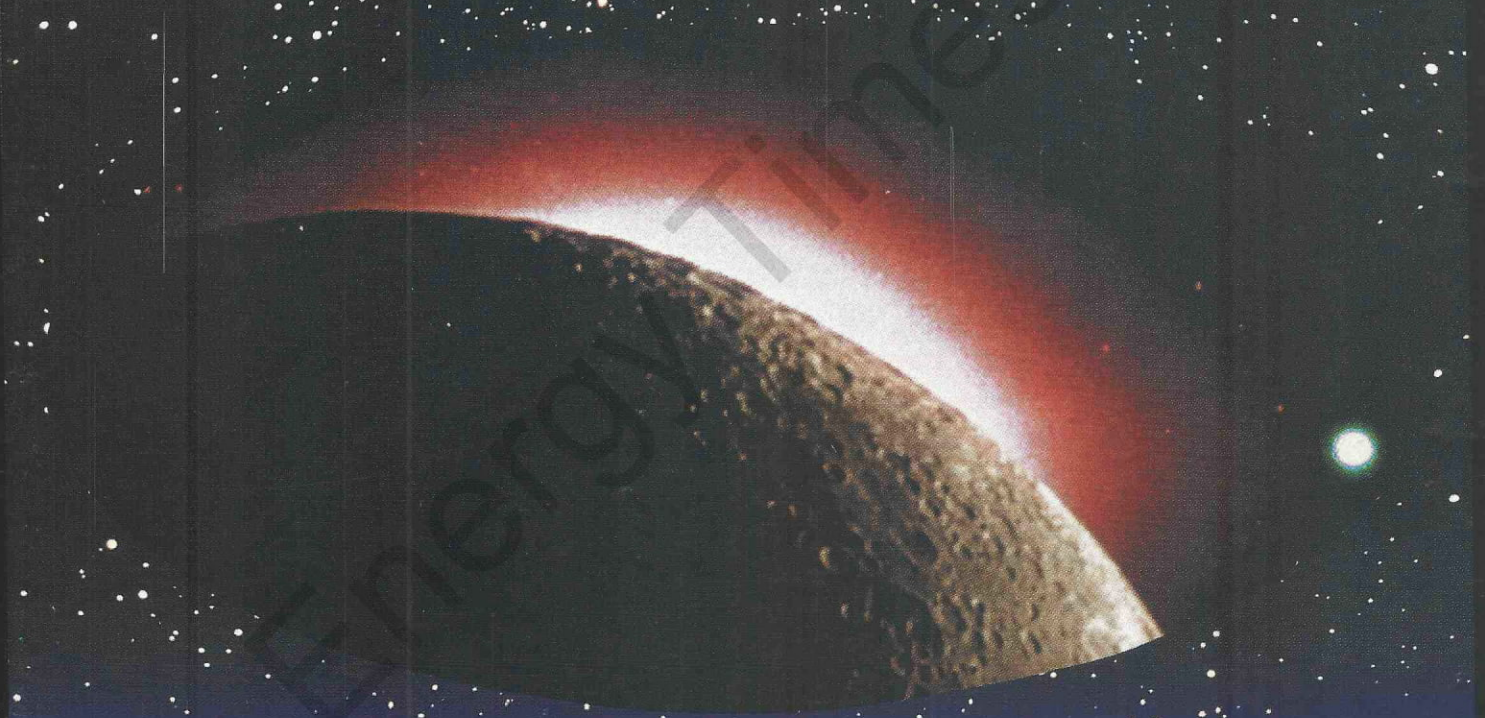
# INFINITE ENERGY™

The Magazine of New Energy Technology
Cold Fusion • New Energy • Renewable Energy
Volume 7 • Issue 39 • 2001

# AETHER

## Science and Technology Reborn



Prospects and Problems in the Science of Free Energy Motors, Antigravity, and More

Einstein Reconsidered — Issue 2

39
0 74470 87813 1

$5.95 U.S. • $7.95 Canada • £3.95 U.K.

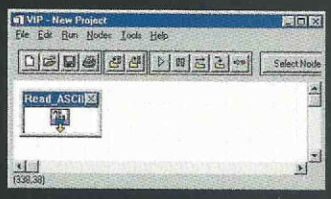
New Energy Times Archive

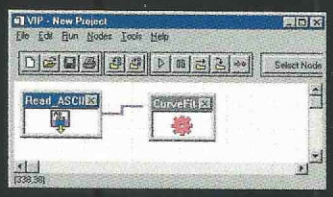
# VIP™ – Go with the Flow

VIP,™ *the Visual IDL® Programming environment,* is a powerful, easy-to-use data flow modeling environment for data analysis and visualization. Create, modify and run sophisticated programs without writing a single line of code. VIP nodes are reusable program objects – share them with your colleagues.

It's as easy as 1,2,3!

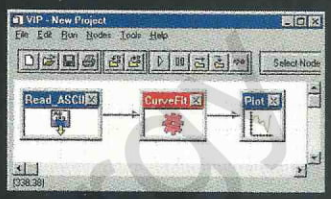
1 Select your nodes and drag them to the workspace

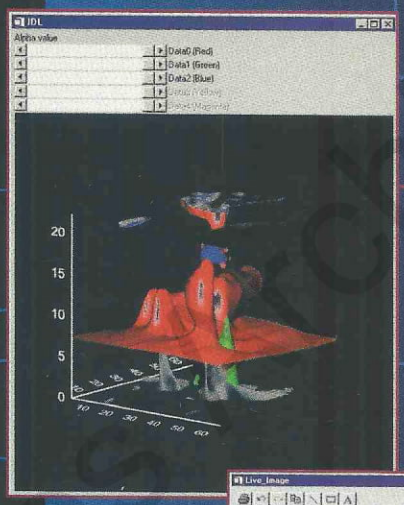


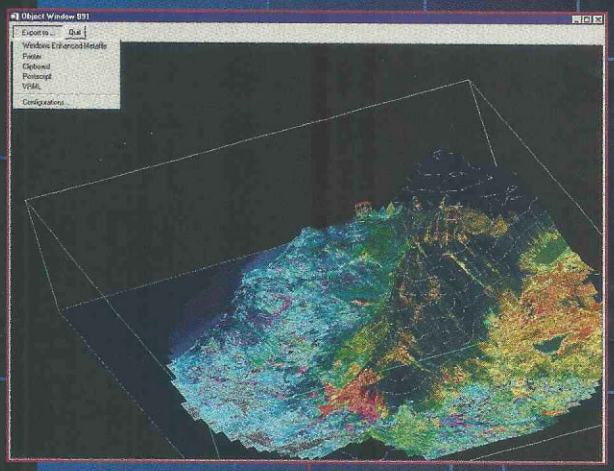




Connect them with the click of a mouse 2

3 Click "run" and watch your program spring to life!






With VIP and VIP+IDL you can

- Visually develop powerful visualization and analysis applications
- Show and explain your program design to others
- Quickly prototype IDL applications
- Develop custom programming nodes
- Generate IDL source code

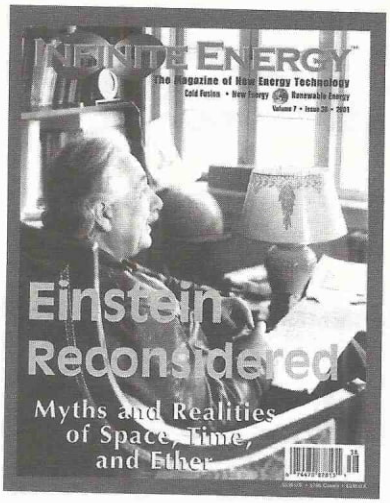
**Visit www.ResearchSystems.com/infinite to request your FREE demo.**

POWERED BY IDL

303.786.9900 info@researchsystems.com

VIP is a trademark of Intersys, Inc. IDL is a registered trademark of Research Systems, Inc.

RESEARCH SYSTEMS
Software ≡ Vision.




Special Issue #38

See pg. 87

for highlights

$5.95

# Einstein Reconsidered

Cold Fusion Technology
P.O. Box 2816, Concord, NH 03302-2816
Phone: 603-228-4516; Fax: 603-224-5975
http://www.infinite-energy.com

# Your Doctor Says You Could Live to Age 100+ and He's Right!

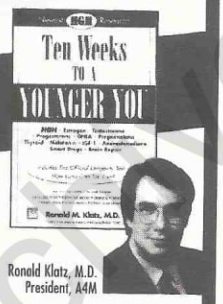
The new science of Anti-Aging Medicine is the fastest growing clinical medical specialty focusing on "optimum wellness and longevity". The *New England Journal of Medicine* has called it the medicine for the next millennium. Already hundreds of thousands of Americans are benefitting from the age-reversing and rejuvenating technologies offered by our physicians.

**Join the battle against aging!**

A4M AMERICAN ACADEMY OF ANTI-AGING MEDICINE

A nonprofit scientific foundation

**FREE!**




Receive a complimentary copy of *Ten Weeks to a Younger You* when you join A4M. $15.95 value.

Ronald Klatz, M.D.
President, A4M

The American Academy of Anti-Aging Medicine, whose membership includes over 7,000 physicians and scientists from 50 countries, is at the forefront of the biotechnology revolution. Keep up with the latest medical advances in controlling and eliminating the diseases of aging.

Join A4M today and receive:

- Free information
- Physician referrals
- Discounts on books, medications, nutrients, seminars, spas and medical programs

**Call 773-528-4333**

Log on to our award-winning web site:
**www.worldhealth.net**
*"Among the top 15 medical web sites"*
Best of the Web, Luckman Internet Yellow Pages

# Materials Characterization and Analysis Service

***www.metricsciences.com***

**See web page for description of analyses:**

***SEM, EDX, AFM, STM, LFM, MFM, RBS, PIXE, NRA, ERD, XRD, SIMS, FIB, TEM, FIB, AUGER, TGA, AA, GCMS, ICP, GC, etc***

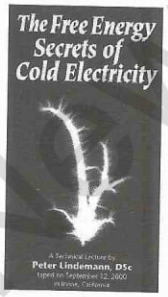
**Call us for pricing and additional information**
*messaging telephone: 602-548-7323*
*contact telephone: 602-758-3279*

# Electronics Consulting Services

- Precision Instrumentation
- Linear/switching power supply
- Schematic Capture, PCB layout
- Embedded Microprocessor
- Light Manufacturing

Our Philosophy: 'Excellence in Electronics'
Email: engineering@pioneermicro.nb.net
Web: http://pioneermicro.nb.net
Pioneer Microsystems, Inc.
1322 Regency Drive, Pittsburgh, PA 15237
PH: 412-369-9920 FX: 412-369-9014

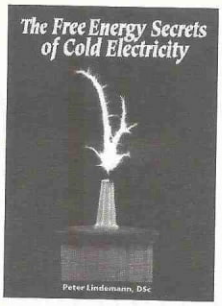
## The Free Energy Secrets of Cold Electricity–Video and Book




170 min.
NTSC or PAL Format
$29.95 Domestic
$39.95 Foreign

*The video* is a technical lecture (September 12, 2000) by Dr. Peter Lindemann. A coherent discussion of the possible connections between free energy claims by inventor Edwin Gray in the 1970s-1980s and the much earlier alleged "free" energy broadcasting ideas of Nikola Tesla. Those who experiment and speculate about energies connected with arc discharges and lightning will find in this material highly creative hypotheses.

*The book* is a wonderful companion to the video. Covers the same material, but goes beyond the video in its publication of text and graphics, making it possible to do detailed study. Appendices include patents by Edwin Grey and Nikola Tesla, as well as two excellent articles by Dr. Lindemann.




Paperback, 133 pp.
$29.95 Domestic
$39.95 Foreign

**Prices include shipping and handling.**

Cold Fusion Technology • P.O. Box 2816 • Concord, NH 03302-2816
Phone: (603)228-4516 Fax: (603)224-5975

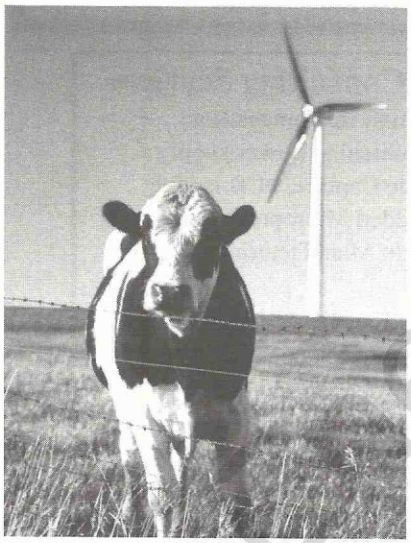

New Energy Times Archive

INFINITE ENERGY™

The Magazine of New Energy Technology

# Einstein Reconsidered
*Issue 2*

# Aether Science and Technology Reborn
*Begins on p. 6*



*"Wind may be the last untapped resource of the North American Heartland."* p. 52

TABLE OF CONTENTS - ISSUE 39, SEPTEMBER/OCTOBER 2001

## ARTICLES

12 Synchronization of Clocks in Special Relativity *Ian McCausland*
14 A Modified Lorentz Ether Theory *Ronald R. Hatch*
24 The Sagnac Effect Contradicts Special Relativity *A.G. Kelly*
29 Subjectivism, Scientism, and Special Relativity *John E. Chappell, Jr.*
32 The Sagnac and Michelson-Gale-Pearson Experiments *Paulo N. Correa and Alexandra N. Correa*
63 The Experiments of Dayton C. Miller and the Theory of Relativity *Maurice Allais*
70 Einstein Superstar *Rory Johnston*
73 Why Galilean Mechanics Is Not Equivalent to Newtonian Mechanics *Patrick Cornille*
80 Special Relativity in Retrospect *George Galeczki*

## DEPARTMENTS

4 Letters to the Editor
6 Breaking Through: Aether Science and Technology *Eugene F. Mallove*
50 NERL Device and Process Testing Update
52 Renewable and Conventional Energy
— Thar She Blows *Bennett Daviss*
55 Eclectic Observer
58 Book Reviews
— *Einstein's Unfinished Symphony: Listening to the Sounds of Space-Time* (Marcia Bartusiak) *Jon Norris*
— *Einstein's Miraculous Year: Five Papers That Changed the Face of Physics* (John Stachel, Ed.) *Bill Cantrell*
— *Einstein and Religion* (Max Jammer) *Eugene F. Mallove*
— *Escape from Einstein* (Ronald R. Hatch) *Eugene F. Mallove*
— *LIGO: Prelude to Revolution* (Edwin E. Hatch) *Eugene F. Mallove*
62 Calendar
87 Classifieds
88 *Infinite Energy* Order Form

**Cover art:** Barbara DelloRusso. **Photos** taken from Photo Disc: Spacescapes.

New Energy Times Archive

Volume 7, No. 39
September/October 2001

**Editor-in-Chief and Publisher**
Eugene F. Mallove, Sc.D.

**Managing Editor**
Barbara A.F. DelloRusso

**Contributing Editors**
Jed Rothwell (Georgia)
770-451-9890
Susan Seddon (U.K.)
sseddon@infinite-energy.com

**Publishing Manager**
Christy L. Frazier

**Editorial Layout Manager**
Joann L. Cheney

**Scientific Advisory Board**
Dr. Harold Aspden, Southampton, UK
Dr. Robert W. Bass, Pahrump, Nevada, USA
Dr. John O'M. Bockris, Texas A&M University, USA
Dr. Dennis Cravens, Cloudcroft, New Mexico, USA
Dr. Peter Glück, Inst. of Isotopic & Molecular Tech., Romania
Dr. Xing Zhong Li, Tsinghua University, Beijing, China
Dr. M. Srinivasan, Bhabha Atomic Research Center, India (ret.)
Dr. Edmund Storms, Los Alamos National Lab., USA (ret.)

*Infinite Energy* magazine (ISSN 1081-6372) is published six times per year by Cold Fusion Technology, Inc., P.O. Box 2816, Concord, New Hampshire 03302-2816. Subscription price: $29.95 U.S., Canada and Mexico, $49.95 other foreign. Postmaster: Send address changes to *Infinite Energy*, P.O. Box 2816, Concord, NH 03302-2816.

*Infinite Energy* magazine presents science and technology, generally in the field of new energy. It provides a forum for debate and discussion of frontier science. *Infinite Energy* is open to all rationally stated points of view. The material presented here reflects the views of the authors, not necessarily those of *Infinite Energy*. *Infinite Energy* assumes no responsibility for individuals who reproduce potentially hazardous experiments contained in its pages.

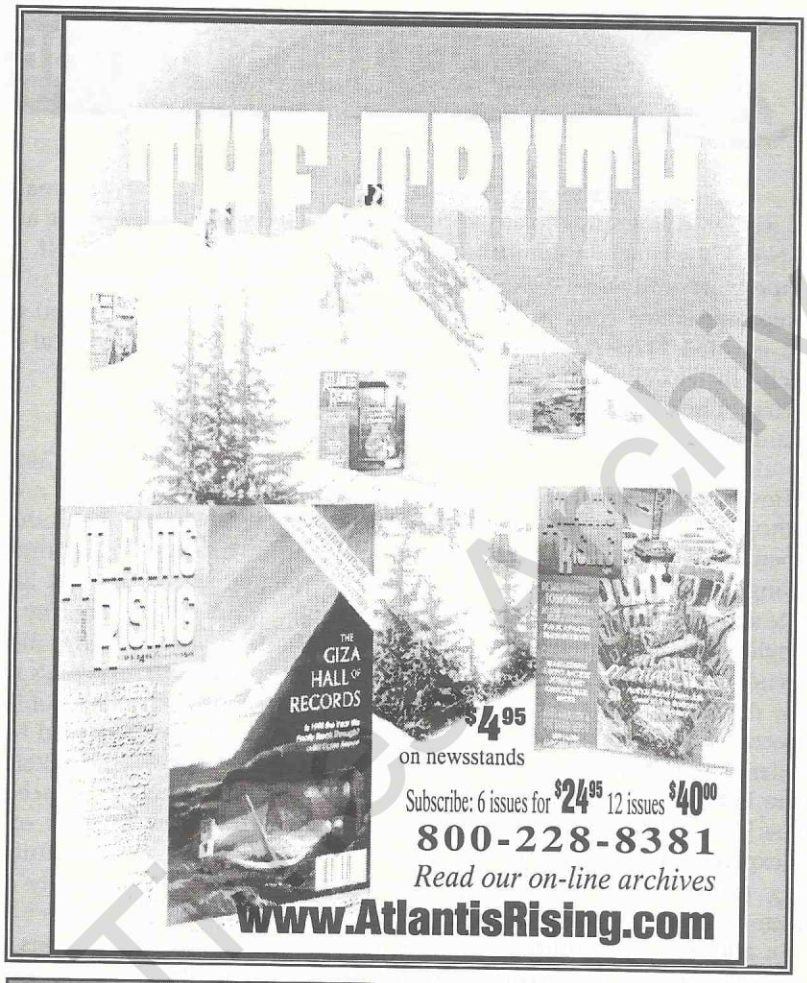
*Infinite Energy* and its editors do not independently verify the content, citation, validity, or paternity of anything published herein by outside authors. Further, *Infinite Energy* and its editors make no representation as to any of the content of the articles published. The content of the works published in *Infinite Energy* are solely the responsibility of the author(s).

*Infinite Energy* Magazine

*Infinite Energy solicits your manuscripts dealing with: Experimental results in cold fusion and new energy, theoretical ideas, contemporary and historical opinions, historical articles, short articles on conventional energy or alternative energy, and book reviews: Contact Barbara DelloRusso, Managing Editor (bdellorusso@infinite-energy.com) to receive Instructions to Authors for our preferred format. Please do not send papers by e-mail.*

P.O. Box 2816, Concord, NH 03302-2816
Phone: (603) 228-4516 • Fax: (603) 224-5975
staff@infinite-energy.com • editor@infinite-energy.com
http://www.infinite-energy.com

Printed in the United States
Copyright © 2001
Cold Fusion Technology, Inc. • All rights reserved.




**Institute for New Energy**
is an international organization to promote new and renewable energy sources.

**Journal of New Energy**
Hal Fox, Editor
Subscriptions are
$150 for 4 issues.

**New Energy News**
Reports worldwide on all facets of new and enhanced energy. Memberships in INE are $35 per year for individuals, $60 for corporations & libraries, and includes 12 issues of NEN.

Fusion Information Center
3084 East 3300 South • Salt Lake City, UT 84109
Phone: 801-466-8680 • http://www.padrak.com/ine/
Also available: Cold Fusion Impact on the Enhanced Energy Age, a book about the near future of the world energy situation.

"LIBERTARIANS *have all the good ideas.*"
—HUGH DOWNS, ABC NEWS
For Libertarian Party information, call toll-free or visit our web site.
800-ELECT-US ★ www.LP.org



New Energy Times Archive

# LETTERS TO THE EDITOR

**Reich's "Bombshell"**

I read with interest, and am responding to, a recent article (*IE* No. 37) entitled "A Bombshell in Science," regarding the temperature difference experiment by Wilhelm Reich, MD, as reproduced by Paulo N. Correa and Alexandra N. Correa, and entitled "The Reproducible Thermal Anomaly of the Reich-Einstein Experiment Under Limit Conditions."

First, I heartily applaud the generally positive attitude regarding this experiment, *i.e.* affirming its validity and profound significance.

However, I must take issue with several points made by the authors. It is not, and never was, the "Reich-Einstein Experiment." Credit for its discovery and implementation belongs entirely to Dr. Reich. It is furthermore highly regrettable and misleading in the extreme to call this ". . . the most bungled experiment in the history of science." The experiment was not bungled; like all new discoveries, it did not spring forth fully developed, but evolved, and indeed following Einstein's objections Reich went to great lengths to respond to the particulars. What, if anything, was "bungled" was not the experiment but Einstein's peculiar response, or non-response, *i.e.* his remarkable readiness to accept a trivial explanation and ignore an experiment which was in fact a bombshell. Reich wrote a long (thirty page) detailed explanation/rebuttal to which Einstein did not have the decency to bother to reply.

In addition, the authors state that regarding the experiment, "For nearly sixty years. . .not one stringent repetition was ever performed." *This is categorically untrue*. See, for example, C. Rosenblum (1972), "The Temperature Difference Protocol," *Journal of Orgonomy*, 10:57-80, my own (under a pseudonym) careful reproduction, using a matched control; again, C. Baker and P. Burlingame (1988), "To-T," *Annals of the Institute for Orgonomic Science*, 5:74-80, another reproduction using the same technique.

Scanning the issues of the *Journal of Orgonomy*, *Annals of the Institute for Orgonomic Science*, *Orgone Energy Bulletin*, *Orgonomic Functionalism*, *International Journal of Life Energy*, as well as a number of Reich's own publications, reveals twenty-nine articles devoted to this experiment, several of which deal in detail with careful, controlled experimental reproductions.

In addition, I take issue with the authors claim that their methodology is the definitive way to perform this experiment. Much better, in my opinion, and the methodology that Reich himself was moving toward, is the construction of a suitable control box of the same size and materials as the ORAC, with both enclosed in a plastic shield to eliminate the effect of convection. Indeed, photographs from Reich's own literature on the accumulator shows matched ORAC and controls under plexiglass shields (see, for example, W. Reich (1951), *The Orgone Energy Accumulator: Its Scientific and Medical Use*, Rangeley, Maine: Orgone Institute Press). With a thermodynamically balanced control (so that its mechanical thermal properties match the ORAC) and proper shielding from air currents, all questions of external convection, conduction, and other artifactual sources of heating are immediately eliminated.

In fact, the balanced control and ORAC set-up has been used for the past several decades by a number of researchers personally known to me, as a way to monitor the pulsation of the atmospheric orgone energy. To these researchers, and myself, the "proof" of the measurement of the orgone has been so well-established by this arrangement that we have moved on to use of the apparatus for tracking of environmental orgone fluctuations.

Dr. Courtney F. Baker
Ambler, Pennsylvania

*The Correas Reply:* Much as we regret to say this, Dr. Baker does not seem to have understood what our article "The Reproducible Thermal Anomaly of the Reich-Einstein Experiment Under Limit Conditions" was about. It was about Einstein's verification of the thermal anomaly discovered by Reich in Faraday cages, whether or not they were surrounded by dielectric insulation. Had Einstein confirmed Reich's results and had Reich thereby obtained the supportive publicity he rightfully expected, we doubt that Dr. Baker would begrudge the jointly conducted experiment the title "the Reich-Einstein Experiment," would he?

Since Reich and Einstein could not agree on the outcome or continuation of the validation experiment they had initiated, and since their exchange of letters stalled—mostly due to Einstein's failure to follow up on the joint project (these authors believe that emotional and political reasons, just as well scientific ones, account for this) but also, one might legitimately say, due to Reich's failure to provide an unequivocal control—this experiment, which could potentially have been so critical to the theories of both thinkers, was de facto bungled. And, we could add, a constellation of political and social forces which has remained in place to this day has prevented any scientific airing of the matter on either side.

In this essay, we were not interested in confronting the entirety of the other issues raised by Reich in his long letter of rebuttal to Einstein; that is the matter of *The Einstein Affair*. We were interested in focusing only upon the Reich-Einstein experiment—what we think is the crux of that affair—such as it was conducted and such as it became de facto narrowed down to the effect of a naked Faraday cage (see the record cited in extensio in our paper). Specifically, we were interested in: 1) Experimentally addressing Infeld's convective current objection—something which we contended in our essay Reich never properly did with any of his controls; 2) making the experiment so stringent that the temperature difference would reduce to zero if such were possible; and 3) following the results of this set-up around the clock.

Dr. Baker's statements of what would be the better way to proceed indicate he missed entirely the rationale of our paper. We were not, in any way, attempting to maximize the temperature difference but, instead, to minimize it or eliminate it altogether if one could! That is why it was a stringent replication!

We found that, by employing a simple control which others had not come up with before, and conducting the experiment indoors, under stringently controlled conditions—designed specifically to be as disadvantageous as possible—the thermal anomaly still remained and was irreducible.



New Energy Times Archive

None of the papers Dr. Baker cites did this: none explored To-T with a simple Faraday cage employed as a suspended control, in the absence of significant thermal radiation, and equalizing any and all convection currents over long time periods, *i.e.* effectively addressing Infeld's objection. We did not, in this paper, set out to study the ORAC per se, but the irreducibility of the thermal anomaly under the most disadvantageous and the simplest conditions. This was never done, which is a tribute to the slowness of even an orgonomist's understanding of what is at stake. However, if Dr. Baker or other *IE* readers would like to improve upon their understanding of the ORACs, then we recommend a careful reading of our ABRI monograph AS2-05 entitled "The Thermal Anomaly in ORACs and the Reich-Einstein Experiment: Implications for Blackbody Theory," available from AKRONOS Publishing at www.aetherometry.com.

Lastly, since Dr. Baker claims to be an expert in measuring orgone energy (rather than just temperature differences), perhaps he can tell the readers of *IE* whether "orgone" energy carries electric charge or not, and just what are the exact ranges of this energy—in orgs, ergs or joules will do. If he cannot, then perhaps he might wish to learn about it at the above website. It is never too late to learn.

Obviously, the work of W. Reich has been the object of organized suppression by official physics. Sadly, however, in these authors' view, it is too often the officiating "orgonomists" who further muddle Reich's work and thereby impede the continued understanding of nature.

Paulo Correa, M.Sc., Ph.D.
Alexandra Correa, HBA

Up here in Rangeley, we have just concluded the Orgonon summer conference, this year on the theme "Emotional Plague." I had been invited by Mary Higgins to be the opening speaker, assigned the task of offering a general introduction to what Reich meant by that term.

As I was beginning to gather my thoughts together for this presentation at the end of May, I was privileged to receive your brilliant and most provocative letter of May 23 with *IE* No. 37 enclosed. As a result of this synchronicity, it occurred to me to use Einstein's casual dismissal of Reich as an example in my talk of an emotional plague reaction in Einstein. It is possible that this inclusion by me has, by now, generated several emails to you from conference participants, so I wanted you to hear from me what prompted these communications.

After detailing Einstein's acceptance of Infeld's "convection current" rationale for explaining the temperature difference above the accumulator, and telling them of Einstein's lack of response to Reich's very careful and lengthy response, I mentioned several details that concerned me in the *IE* articles: First: The Correa's title, referencing the "Reich-Einstein Experiment." This designation would immediately suggest that Einstein played some original part in Reich's work.

Second: The Correas referring twice to the ORAC as a "contraption." This may sound like a trivial objection, but words are important, and *that* word has pejorative connotation.

At the risk of sounding like the psychiatrist that I am, I've been thinking about *why* the Correas would use that word. Is it possible that they may feel just slightly disdainful of the *simplicity* of Reich's ORAC, with its *massive* implications, compared with the relative complexity of their own PAGD apparatus? (Maybe offering up such an interpretation is out of order, but my collegial dialogue with you when you spoke at Temple University made me feel free.)

Third (and much less important than the other two): The reference to Reich's invention as a "Faraday cage." Now I realize that what the Correas call a "naked ORAC" *is*, in effect, a Faraday cage. But we're talking here about Reich's experiment, and *Reich's* experiment tested the thermal difference in an orgone accumulator. I am not unmindful that the Correas were stacking their experiment *against* finding the thermal anomaly, thus using only the metal box. Much more could be said here, but for now, in the interests of brevity, I'll not go on about this point.

None of this diminishes my boundless appreciation for you, for IE, and all you've done to promote and provide a forum for the discussion of "free energy." I just felt it fair to let you know "from the horse's mouth" what generated the emails you might be receiving.

Dr. Patricia Middleton
Rangeley, Maine

*Dr. Mallove Replies:* The term "Reich-Einstein Experiment," in my view, in no way obscures the fact that the Correas know and state clearly that the experiment originated with Reich. I think the term is appropriate because it properly assigns some responsibility for the experiment's assessment on Einstein's shoulders. Thus, the Correas are giving notice of Einstein's involvement and responsibility, something that Reich attackers and ignorers will not like to hear. That is precisely why I like to use the phrase myself! Considered in this light, you may have a different attitude about the terminology.

The use of the word "contraption" was in no way intended by the Correas as a disparagement. I think it is stretching matters to consider that it was used pejoratively, but I understand that since the Reich community has been so under fire for all these years, any slightly ambiguous phrase could be misinterpreted. I can tell you that the Correas have a deep and profound admiration for all of Reich's scientific work. There was no offense intended. Yes, they do take some of the "Reich movement" to task for this or that, but these objections, in my opinion, should be minor issues for you compared to the larger message of their experimental and theoretical work.

Finally, I am deeply gratified by your most generous praise for our work at *Infinite Energy*.—*EFM*

## Sonofusion Reactions

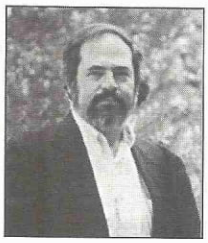
In *IE* No. 36 (p. 18), Ken Rauen and Eugene Mallove report on their experiment with the sonofusion reactor of Roger Stringham. They describe the reaction chamber as containing a copper foil immersed in heavy water in an atmosphere of argon and exposed to 40 kHz acoustic wave packets. This reactor is reported to produce excess energy and helium. Many people will have their own pet theories on what is producing the excess energy and helium. I have decided to add mine to the pile.

It is also reported that during the experiment, the copper foil developed a small hole in it. As I see it, the acoustic waves cause some of the copper atoms to be broken off the foil and forced into suspension in the heavy water. Although

**Letters continued on page 85**



New Energy Times Archive



# Aether Science and Technology

by Eugene F. Mallove, Sc.D.

Free energy devices, a.k.a. "perpetual motion machines," have long been scorned as myths by the scientific establishment. Any device that appears to have no *visible* or *readily identifiable* fuel or energy source is regarded by physics as impossible. Since cold fusion had no confirmed nuclear by-products when it was first announced in 1989, the scientific establishment prematurely threw it into the "free energy" bin and dismissed it. It has remained in that category for the past dozen years, despite overwhelming evidence for nuclear by-products associated with cold fusion excess heat, published by many competent researchers.

Long before cold fusion, for at least a century, many inventors had claimed to have created "over-unity" or free energy devices, which purportedly operated on reformulated electromagnetic principles. We have discussed many of these in the pages of this magazine. To have any chance of working, such machines logically could not violate a generic energy conservation principle; they would have to extract energy from some hypothetical invisible plenum, such as the "aether" or "ZPE"—zero-point energy.

Some of these claimed devices may actually have worked or *would* work as advertised if convincingly tested. Whatever the facts of such development and testing, it is undeniable that no such free-energy device has entered the scientific or commercial arena, even as a widely available demonstration motor/generator or proof-of-concept unit. Since people are visually and tactily-responsive ("seeing is believing"), this absence of accessible evidence for free energy machines understandably has made even some open-minded devotees of new energy highly skeptical about whether they are possible. This may be about to change.

In my most recent editorial (*IE,* No. 38), which was devoted to reconsidering Einstein's work, a very important project that is continued in this issue, I mentioned newly emerging evidence for laboratory-tested devices that tap into an "energetic aether." These, of course, are in flagrant violation of allegedly rock-solid modern physical theory, including Relativity. As our last issue went to press, the website of Dr. Paulo Correa and Alexandra Correa <www.aetherometry.com> had just appeared; it was not possible to elaborate about what I and others had learned of such devices at the Correa laboratory.

Now it is possible to be more specific. Since not all readers will have instant web access, and because of the importance of these observations, I am glad to be able to publish a report on my witnessing of such apparent devices, as well as the views of Mr. Uri Soudak, former Chief Technology Officer of Israel Aircraft Industries. In no sense do these letters provide the "seeing/testing is believing" evidence that is required to convince fellow new energy colleagues. But I can think of no realistic scenario involving these careful, hard working scientists that would make the Correa work other than a landmark scientific and technological development. Still, as my letter clearly states, the aether motor technology will have to be replicated by others, or distributed as demonstration devices, for it to be widely accepted. It may be extremely frustrating to readers—and to *me*—that these motors are not currently widely available. However, I am satisfied that the Correas are proceeding along an acceptable program of scientific disclosure and business development, which has already been initiated by the scientific experiments elaborated on their website. Now for the testimonial letters:

**— Mallove's Letter to the Correas — of June 14, 2001**

Dear Dr. Correa and Alexandra,

Thank you for asking me to write a brief review of my observations after my visits to your laboratory in the Toronto, Canada area in August 2000 and in March 2001. Initially, the observations at your laboratory were covered by a Non-Disclosure Agreement (NDA), but now that you have requested this testimonial letter, you have my permission to post it and use it as you please. [Editor's Note: Posted as of late July 2001 at <www.aetherometry.com>.] I wish to convey, with as great precision as I can in this short space, my observations and conclusions about your work with what might well be called "aether science and technology."

I am trying to be as circumspect as I can about this most remarkable new direction for science, which you have evidently advanced considerably. That takes some doing even for one who is experienced with the astonishing scientific findings in the low-energy nuclear reactions (LENR) field, because what I observed at your laboratory is so very dissonant with what I had come to understand about the alleged certainties of modern physics. Frankly, I was shaken and stunned by the observations and



New Energy Times Archive

measurements in your laboratory when I was there. I will never forget those experiences. These are my views and only my views, for no one else from *Infinite Energy* was with me and can attest to my observations or has any basis for questioning or substantiating them, apart from their trust in my abilities and integrity.

First, let me mention to newcomers that your technical work has appeared before in our magazine, *Infinite Energy*, beginning in 1996 in connection with your patented Pulsed Abnormal Glow Discharge (PAGD™) electric power generator technology and experiments (Issue Nos. 7, 8, 9, 17, and 23). That excess energy technology was validated to my satisfaction at high power level, using multiple measuring techniques during the on-site visits—employing conventional electric meters, a digital storage oscilloscope, and a computer data acquisition system. On my last visit, when your PAGD™ inverter technology had improved considerably from my first visit, I observed an input DC power to the PAGD™ reactor of 50 watts, with an output motor power (mechanical shaft power of approximately 500 watts). I commented to you that this could easily be made self-sustaining with a DC generator on the output shaft of the motor, and you agreed with that general conclusion. My understanding is that several other respected Ph.D. scientists have similarly been present in recent times at your laboratory to witness the PAGD™ experiments and even more remarkable ones connected with your already self-sustaining Aether Motor devices, which I will discuss below.

Issue No. 37 (May/June 2001) of *Infinite Energy* contains your most recent paper with us—one of the most important papers *Infinite Energy* has ever published, "The Reproducible Thermal Anomaly of the Reich-Einstein Experiment Under Limit Conditions." Anyone who wishes to gain an insight into the quality of your work should read this. But that article, I must emphasize, is but the merest "tip of the iceberg" of your much wider discoveries and technical contributions, which you have reviewed with me on both visits and in other conversations. As my editorial in Issue No. 37 ("A Bombshell in Science") notes, you intended to be publishing much, much more of your experimental and theoretical work on the internet. You have kept your promise and have done so. You have my congratulations and gratitude for this landmark publication. This will make possible widespread validations of your scientific work. I must emphasize to all readers of this letter that reproduction by others is the only way in which your experimental and theoretical work will ultimately be accepted. I know that you seek such reproduction by other careful investigators, because such remarkable reports from unfamiliar scientific territory cannot be accepted at face value by others as true, even though I am truthfully relating them.

I had reviewed some of your written material already on my visits with you and it is spectacular, as those who will download from your new web site will discover. As we well know, there are severe obstructions to publishing frontier scientific work today and this is why you have chosen to publish on the internet for modest down-loading fees. In recent times we have serendipitously discovered that there are actual lists of *forbidden topics*, which formally and informally exist at two major scientific publications, *Science* and *Nature*, and we are all familiar with how excellent work in the LENR field has been banned from those publications and ridiculed in flimsy journalistic accounts. I very much regret that your experimental and theoretical work could not have been reviewed and then published in the various mainstream scientific publications, where it should, by right, be placed. That is a loss for the world and for those publications, but such is the nature of the "peer review" system that has grown to be such a rigid filter against ideas that change reigning scientific paradigms. Nonetheless, I do expect that the publication of your series of extensive articles on the internet will have a revolutionary effect, particularly once your experimental work begins to be validated by others. I think that this will be extremely beneficial to the entire so-called *new energy* field, which is much in need of comprehensive theories with evident predictive value, as your work surely appears to have— based on the many experiments that you showed me, not all of which are related here.

The subject now concerns experiments and conclusions that go far beyond your previously published and patented PAGD™ work. The bottom line of all your work is the complete validation, it seems to me, of the existence of an energetic *aether* (or *ether*, as some may prefer), which you have learned to tap technologically in various ways to make self-sustaining motors. There is simply no other way of explaining what I observed. Others may try to invoke theories of "ZPE" (which apparently does not enter the picture in either an experimental or theoretical sense at all) or will claim that you may be engaging in fraud. That will be their problem, not yours. I firmly believe that you have honestly confronted nature and have no interest in engaging in flimflam—especially since there are far simpler ways to gain financial advantage than by performing elaborate experiments (which, when published, can be falsified or criticized by others) and interlinked theories. If anything, you have held back this information about your technology longer than I would have preferred.

Your findings and accomplishments, above all, open up a new energy source, but it is also obviously profound, new physics. This has come about because of your vigorous pursuit of the truth about the work begun by Dr. Wilhelm Reich in the 1930s and pursued by him and colleagues into the 1950s. I regret to say that prior to your informing me of your intellectual investigation along the general lines of what Reich had begun, I had little knowledge of the work of Reich, and had actually absorbed the insidious and nasty media-generated opinion that it was perhaps some kind of "New Age" smoke and mirrors. How wrong I was!

Let me say that my editorial in *Infinite Energy* No. 37 should give readers the gist of how important I think your paper in that issue is for physics and how historically important was the episode that involved Albert Einstein, Wilhelm Reich, and Einstein's assistant Leopold Infeld in the 1940s. As you know, if it is referred to at all in general biographies of Einstein, the Reich interaction and experiment is dismissed as of no consequence. And, as my editorial points out, Dr. Reich was marginalized and mocked by *Time* magazine in 1999 on the same page with Drs. Fleischmann and Pons. Apart from

New Energy Times Archive

**The discovery and proof of an omnipresent, biophysically active energetic aether. . . is comparable to the magnitude of the Copernican upheaval, and opposition to it will be, as expected, no less intense.**

the misgivings many might have due to circulating misinformation about Reich and his former focus on matters of sexuality and politics, I wish to inform them that I am absolutely certain that the thermal anomaly of the Reich-Einstein experiment is real and has no trivial explanation. I have observed it myself independently under careful conditions here at our New Energy Research Laboratory (NERL) and will be publishing my results at a future time. (Others should know that the thermal anomaly is very easy to observe with *calibrated* mercury thermometers of the proper range and resolution—0.05°C highly recommended—but there are some pitfalls too, so they should read your paper carefully and the much greater body of experimental information that is on the new web site. This puts the thermal anomaly in a broader physics context.) I am also now quite certain that the other physics anomalies observed and published by Reich are real—the electroscopic observations as well as the observations of effects on energy-saturated vacuum tubes, a serendipitous discovery of his with Geiger-Muller tubes. I have not personally measured these latter, but I note that you have done so extensively. It evidently is the basis upon which your Aether Motors work, otherwise I cannot imagine how you could have pursued those motors to the point that you have reached. You have most certainly gone beyond what Dr. Reich claimed to have achieved in these motor effects stemming from energy accumulation in ORACs (orgone accumulators).

On August 27, 2000 at your laboratory, we completed lengthy discussions and activities which included: an overview tour of your most impressive labs, a review of significant introductory aetherometric papers for your then forthcoming web publications, exercising of the PAGD apparatus, demonstration of various heuristic electronic experiments connected with externally powered electromagnetic coils, and demonstration of an apparently clear, significant (70% reduction level) antigravity effect on an approximately 45 milligram piece of gold foil. I was then given the first demonstration of your first stage Aether Motor. You asserted that it had no battery or other active energy producing elements within its small, approximately 0.2 cubic foot, electronics box, which was then closed. Its only evident power source were two adjacent, approximately one-cubic foot each, metal Faraday cages, each covered by removable ORAC-type covers of about two-inch thickness (with no bottoms). I opened the doors to the Faraday Cages to see that they were empty of power sources. I have no doubt that you would allow me to open the delicate motor electronics box to examine it fully if I were to visit your laboratory today. However, I do not represent to anyone that I have examined its innards. (Your honesty in this matter is accepted by me, pending proof otherwise. Additionally, I have discussed the contents of the electronics box with another Ph.D scientist, who recently visited your lab, and who saw, upon the electronics box being opened for his inspection, only electronic circuitry, no batteries.)

The ORAC covers were removed to show me that nothing was electrically connected to the metal boxes. No matter, because each of these ORACs were connected to the Aether Motor by only a single insulated copper wire, with a metal contact. There was no evident ground wire or metal object of any kind to complete the circuit to the ORACs! Yet the motor started upon being connected to the ORACs. Its short output shaft could be mechanically stopped by my hand and it had the tug of a motor I would estimate to be in the several watt range. It would restart instantly upon being released. On that year 2000 visit, the motor moved from 50 RPM to the several hundred RPM range, varying with time and conditions, but on my second visit, you had arranged a second Aether Motor set up that operated in the several thousand RPM range, as shown by a tachometer. The tug of its shaft seemed to put it in the few tens of watts range in mechanical output. I would have wished to stay longer to make exacting mechanical measurements of the output power, but the overwhelming experience of observing interaction with the motor was quite enough for that visit! I hope to return to your facility to make such detailed measurements with you. I was most astonished and fascinated to observe effects with your Aether Motor that seem incontrovertibly connected with the *biophysical* energy processes characterized by Reich. Holding my hand to one of the wire leads to the Aether Motor would make it increase its speed! Holding another person's hand, with mine still attached to the wire lead, would make the motor run even faster! These are the most astonishing observations I have ever made. I was standing on a concrete floor with rubber-sole shoes. I can think of no other explanation (barring fraud, which I rule out) other than some sort of "biological transduction" of energy into the motor. Moreover, the motor circuit included an external transparent glass evacuated discharge tube with two aluminum plates. While an Aether Motor was operating, bright discharge sparks were occurring in the glass chamber between the plates. It is a completely alien concept to accepted physics, but apparently true, that ordinary mass-bound charges, electrons, were apparently being brought into existence from the plenum of the energetic aether.

On each of the visits, the motors appeared to run indefinitely, and you asserted that you had run them for periods of up to eight hours, but that there was no fundamental limit to their being powered indefinitely by the new energy source — the energetic aether. There was no apparent diminution of motive power while I was in the room for a period of approximately one hour.

We continued each visit with further discussions of the performance characteristics of the new Aether Motor technology and its possible extension into demonstration devices, which I hope will eventually be forthcoming. (I am happy that you have now completed the patent application process for these Aether Motors.) We also discussed other validation approaches to further your efforts and proposals. I must say that of all the laboratories I have visited in my entire life in science and engineering, yours has been by far the most impressive and worthy of significant funding. I am deeply appreciative that you gave me the opportunity to learn about your experiments and theories at a level that few if any outsiders previously have had. You have done absolutely brilliant work that deserves the most rigorous verification and

New Energy Times Archive

**The mechanistic description of the world as "nothing but" atoms and subatomic particles flitting about in a formless vacuum, through which only electromagnetic radiation flows, is completely wrong. The complex aether is the most fundamental plenum of existence.**

ultimate acceptance by the scientific/technological community. Whether your aetherometric theories of motor operation are accepted is another question, but I have little doubt that the motor technology itself will be validated in due course one way or the other, providing you are forthcoming with details of construction.

[*Editor's Note*: The Correas' website designates under "Experimental Aetherometry, Volume 3," seven extensive technical modules that will relate the rediscovery of the Orgone motor. Since these modules are expected to be like the eight high-information content modules on aetherometry already released, it will be possible for other parties to build aether motors to confirm (or reject) the Correa claims. I understand that these aether motor modules have already been prepared, but they have not yet been released due to patent application considerations.]

Let me end this testimonial with an assessment of the greater significance of the discovery and proof of an omnipresent, biophysically active energetic aether is comparable to the magnitude of the Copernican upheaval, and opposition to it will be, as expected, no less intense. Let me state the implications and conclusions into ones of which I am personally very certain:

• There is an energetic aether that can be tapped to create electrical power and heat.

• The energetic aether has definite biophysical properties with possibly a strong bearing on living systems.

• The Second Law of Thermodynamics has limited validity, and it is clear from the historical record how such a disastrous restriction was postulated. The thermal anomaly of Reich is the final nail in the Second Law's coffin. The Second Law is not absolute and must be revised or extended.

• There is space and time but no space-time. That is, Einstein's theories of relativity are fundamentally wrong (despite their efficacy in rote formulaic application in certain areas) and must be replaced by one or more developed or developing theories.

• Most important for technology as well as science: *Mass free* charges apparently exist as part of the energetic aether and are the basis for many of the critical observations made by Reich and others since the 1940s, including the motor-force observations that Reich made and published and his apocryphal but undoubtedly real (and witnessed) self-running electric motor. You have gone beyond his work to make robust systems.

• Gravity can be controlled by electromagnetic means.

• The mechanistic description of the world as "nothing but" atoms and subatomic particles flitting about in a formless vacuum, through which only electromagnetic radiation flows, is completely wrong. The complex aether is the most fundamental plenum of existence.

It has been a long time since March 23, 1989 when I became involved with the cold fusion controversy, and later began to reassess what other anomalous claims in science—particularly those associated with energy—might be real. We have seen many, many strange things, about many of which to this day we cannot be certain. Other claims that were initially surprising—such as heavy element transmutation—have now gained acceptance, at least within the cold fusion/LENR ranks. It seems that matter can disintegrate and change in drastic ways with minimal external perturbation. It is possible, but barely so in my view, that cold fusion and LENR will turn out to have nothing to do with an energetic aether and may be completely explainable by "conventional" physics. That may be true within certain limited regimes, but not I think, in larger scope. In my view, the heavy element transmutation aspects are particularly amenable to explanation under the influence of mass-free charges in an energetic aether. We shall see.

What you have shown quite clearly is a class of new discoveries, processes, and theories, which recapitulate discoveries that were marginalized earlier in the twentieth century. The matter of the "Reich-Einstein Affair" is particularly appalling, but those familiar with the dynamics of the "cold fusion" controversy will not be surprised. These emerging discoveries now underway will lead, I believe, on a straight path to the development of free energy devices and propulsion systems of unlimited capacity. I believe that a common historical pattern will be repeated: many simultaneous discoveries of effects connected with this energy will occur. Technological devices are the only way in which the scientific establishment will be forced to change its very bad ways and gross misconceptions about physics, chemistry, and biology. The fossil fuel age will begin to come to a grinding halt and the age of free energy and unlimited powers for humanity will begin. If we are lucky, the world of science, as we have known it, will soon begin to undergo a radical, wrenching change. It will not be easy, but it is now inevitable. —*(End of Letter)*

**— Uri Soudak's Letter to the Correas — of June 22, 2001**

*(Reprinted with the permission of Uri Soudak and the Correas.)*

The launching of this website is a celebration for me. I have known the Correas for many years now and am well acquainted with their work. My first encounter with them was while I was deputy for Israel Aircraft Industries' Executive Vice President and CTO. We were at that time searching for new technologies and were in the process of converting a heavily military industry into a more commercial one. The field of Energy seemed to us a good investment and one of the world's imminent needs. I received a detailed proposal from the Correas, presenting their mature invention of the PAGD/XS-NRG device, which was detailed both in patents and in their literature. Having been exposed to hundreds of inventions and proposals as a part of my daily work, I was surprised at the depth and detail of a device that, according to current physical science, could not possibly be working!

Several months later, my superior retired and I became the Chief Technology Officer of IAI at their headquarters in Ben-Gurion Airport.

New Energy Times Archive

**From an experimental examination alone of the electroscopic interactions of the human body, the authors conclude, as Reich did, that there is an energy specific to living systems and to the ground, which is neither electric nor electromagnetic.**

However, IAI was then entering a difficult financial situation and further investigation into the Correa invention was postponed but not abandoned. As soon as I could, I requested a demonstration and traveled to Toronto to attend it, which turned out to be an exhilarating experience. I told the Correas at that time that I would propose their project for investment by IAI.

Two factors were against us however: first, the high risk that was involved in a phenomenon that was not yet backed by a solid theory, and secondly, the fact that IAI was not completely out of its own financial problems—its priorities were set elsewhere. Nevertheless, I thought that a small investment could be made to greatly reduce the risk by a thorough checking of the device at IAI premises. In 1997 however, I decided to leave IAI for several reasons, one of them being the CEO's decision to abandon this route.

Moving to new Executive jobs in North America, I have kept my contact with the Correas, both because I admired their continuous and amazing work, and because of my growing admiration for their talent and wisdom. I see myself as very fortunate indeed in having been able to closely follow the revelations of the new Theory of Synchronicity and the stream of unbelievable experiments and devices that followed. I was part of their joy when the universe unfolded in a pure and simple way to them which permitted the solving of many of the inconsistencies and paradoxes in existing physics. Finally I could understand mass and massless energy in all its forms. A year ago I witnessed experiments to tap into the unlimited energy surrounding us and into a simple formation of gravity fields. No one on earth has achieved this before!

This is why the launching of this web site is a celebration. It is opening a new era for mankind. An era without energy limits, an era without any transportation limits, an era devoid of need for destruction because there is no limit to prosperity. Paulo and Alexandra Correa, thank you!

*—(End of Letter)*

### — Where to Go From Here —

The scientific experiments leading to the aether motors and the build-up of a theoretical framework under the rubric "aetherometry" are now beginning to be detailed on the Correa web site. Whether outside parties will be sufficiently motivated to begin verification efforts remains to be seen. There is a paradox: Early release of detailed descriptions of the aether motor technology could have a suppressing effect on systematic efforts to confirm the scientific measurements of aether properties by means of electroscopes and thermometers. But *widespread* convincing proof of aether motor function could as well spur retrospective examination of those fundamental measurements. The Correas have not chosen the latter course, and that is their prerogative. For now, they are exploring with select people other ways to further their research and its commercial potential.

Open-minded scientists concerned with new physics should temporarily put their theoretical prejudices aside and examine the large body of disclosed aetherometric evidence. The Correas first discuss what they term the "gravitokinetoregenerative phenomenon," a property that turns on its head the conventional "static electricity" assumptions about what keeps the delicate gold leaves of a conventional electroscope in deflection. Their concise abstract:

"Basic experiments demonstrate that, for any set deflection angle of the electroscope leaf from the vertical under atmospheric conditions, the work performed against gravity by a 'charge gas' trapped in a conductor is neither predictable from current electrostatic or gravitational theory, nor equivalent to the electric energy calculated or measured oscilloscopically as being required to charge the said electroscope to the set and calibrated deflection. Furthermore, the results suggest that, quite independently from the mechanism of charge cancellation by recombination with ions of opposite polarity, electroscopic leakage rates depend upon the rate of regeneration of the kinetic energy of the trapped charges performing both electric and antigravitational work, as sourced

Photo by Barbara DelloRusso.

A simple, commercially available leaf electroscope.

upon hidden variable(s) in the local medium. We found therefore that, in order for the electric work of repulsion performed by charge against charge to be conserved, the work performed by charge against local gravity must be constantly supplied by regeneration of the kinetic energy of the trapped charges from the surrounding medium."

Ergo, every leaf-electroscope since time-immemorial has been a "perpetual motion machine" in disguise, powered by some aetheric environmental factor! They then proceed to examine long-time records of spontaneous electroscope discharge rates to find correlations with environmental factors. In these they attempt to find local and non-local hidden variables, both electric and nonelectric, which affect discharge rates. In one of many provocative conclusions, they propose that a hidden variable of solar origin tends toward the *arrest* (stopping) of discharge in atmospheric electroscopes. They summarize, "Only this nonlocal variable therefore could account for the power of the local medium to regenerate the kinetic energy which charge spends in performing work against gravity when trapped in a conductor subject, in turn, to electrostatic repulsion. Essentially, the kinetoregenerative power of the local medium is in turn replenished by this component of solar radiation."

Of course their objective from then on is to identify the theoretical mechanisms of aether function that can do this. By their fourth web-posted monograph, "Electroscopic Demonstration of Reverse Potentials of Energy Flow Able to Draw Kinetic and Electric Charges," they are able to show by involved but conceptually simple demonstration how utterly

New Energy Times Archive

wrong our understanding of simple electroscopes has been, if their assessment is correct. Their short abstract says it all:

"Methodological objections are raised to the conventional understanding of the charged states of the electroscope, and a new classification of charging methods is proposed. The existing hiatuses in conventional electrostatic theory of the electroscope stem from complete ignorance of the electroscopic action of observable reverse potentials, first proposed by Dr. Wilhelm Reich over sixty years ago, which establish centripetal radiative fields capable of drawing both nonelectric kinetic energy and the electric energy of charge trapped in conductors. From an experimental examination alone of the electroscopic interactions of the human body, the authors conclude, as Reich did, that there is an energy specific to living systems and to the ground, which is neither electric nor electromagnetic."

This revelation of an entirely new world of physical phenomena, by means of extremely simple experiments, is reminiscent of Oersted's 1820 experiment in which the deflection of a suspended compass needle near a current-carrying wire revealed the presence of an unsuspected surrounding magnetic field.

Today's physics establishment imagines that only giant particle accelerators, "gravity wave" detectors, and gargantuan neutrino capture tanks can move the frontiers of physics outward. It would never take the time to visit a high school physics lab, obtain a suitable electroscope, and attempt to verify (or reject) the Correas' claims. Do not forget that these same establishment folks in 1989 thought that they could debunk cold fusion by quick theoretical studies and rushed, poorly performed experiments. These physicists live in a dreamworld of the arrogance of power.

In their fifth monograph the Correas address the many possible objections to unconventional explanations of the *thermal* anomalies associated with orgone accumulators (Oracs). In addition to the *indoor* Reich-Einstein thermal anomaly experiment, which they presented in digest form in Issue No. 37, the Correas present much more extensive data from *outdoor* experiments. They claim to show that the thermal anomalies cannot be accounted for by the blackbody spectrum of radiation from either the Sun or from the Oracs themselves.

By monograph six, the Correas are able to spell out what they believe to be the outlines of the governing physics in both the thermal and electroscopic experiments. Their abstract, in part:

". . .we present evidence for the fact that the energy concentrated inside ORACs and responsible for the anomalous deceleration and arrest of electroscopes placed within them, irrespective of charge polarity, is neither thermal nor electric. The proposed methodology allows us for the first time to determine the comprehensive values of the energy and power of ORAC devices (in Reich's idiom, to measure the actual orgone energy values, and their variation, within these devices), and as well to establish that the electroscopic kinetoregenerative phenomenon is not a thermal one. We close the presentation by suggesting that the Aether energy effect responsible for the thermal and electroscopic anomalies observed within the ORAC is neither electric, nor electromagnetic, nor gravitational per se, but antigravitational. In full agreement with our Aetherometric Theory of Synchronicity (AToS), we conclude that, by a heretofore unknown process, charges trapped in a conductor undergoing electrostatic repulsion—or, for that matter, in a dielectric undergoing electrostatic repulsion, as can be easily observed with electroscopic leaves made of dielectric materials—and subject to a local gravitational potential, are able to tap local Aether energy and to convert some of its nonelectric and nonelectromagnetic energy into their kinetic energy. This kinetic energy is associated with charge but distinct from it, and charge spends it precisely to counteract the continuous action of the local gravitational energy. This counteraction is maximal at electroscopic discharge arrest. The kinetoregenerative phenomenon demonstrates therefore that there exists another form of energy which is neither electric, nor electromagnetic, nor gravitational. Yet, this energy appears to be responsible for an array of electric, thermal and gravitational anomalies."

So there you have it, if the Correas are correct, a radically new conception of energy that pervades our terrestrial and cosmic environment—biophysically active and able to be observed by the most basic of physical measurements. This is obviously a tall order to try to accept after a lifetime of thinking about physics in very different terms. (It is not easy for *me* though I have personally observed motors and energy collectors that apparently embody these principles!) In essence, the Correas are suggesting that most of the physical universe has been in hiding and that it can be revealed through their aether measurement methodologies. Though this may seem very "Copernican" in its pretensions, this is not all that much more than mainstream physicists claim when they speak of cosmic "dark matter," "dark energy," "quintessence," or the like comprising the vast bulk of the universe. The main difference is that the Correas provide concrete, falsifiable, table-top experiments to bolster their claims. In the tradition of Einstein's famous "gedanken" experiments that so set back physics, Theory-of-Everything speculators today in mainstream physics pose ever more esoteric mathematical sand castles (*e.g.* string theory), almost none of which can be checked with experiments.

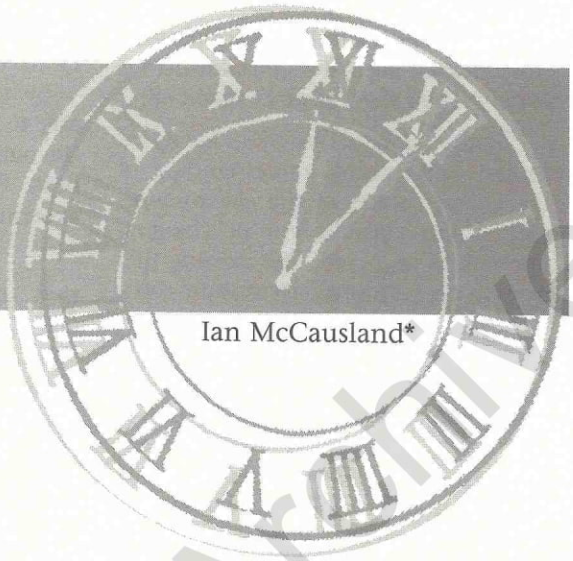
It will fall to engineers and scientists of good will to examine this most profound proposal for a new scientific order, to explore it to its core, and to change the world with it if they find that it works. To quote the Correas from their web-posted essay, "Usages of Science: Use and Abuse of Physics": ". . .we tend to think about science as merely intellectual capacity to comprehend the world. But comprehension itself is worthless—for actual understanding only comes from transforming the world, from acting upon what is comprehended, from experimenting, from altering our perception."

At *Infinite Energy* and New Energy Research Laboratory we will do our best to explore and illuminate for our readers and colleagues this most challenging and promising field, the rebirth of aether science and technology. As I said in ending my cold fusion history in *Fire from Ice* (1991): ". . .heed the eternal challenge of science not to follow where the worn path may lead, but [to] go instead where there is no path, and leave a trail." ■■■

**In essence, the Correas are suggesting that most of the physical universe has been in hiding and that it can be revealed through their aether measurement methodologies.**

New Energy Times Archive

# Synchronization of Clocks in Special Relativity



Ian McCausland*

**Abstract**

*Einstein's definition of the synchronization of a pair of relatively stationary clocks is fundamental to his special theory of relativity. The definition involves three clock readings, two on one clock and one on the other, when the clocks are illuminated by flashes of light. Although observers in all states of motion would see the same set of three readings and should therefore reach the same conclusion about the synchronization, Einstein argued that clocks that were synchronized for an observer stationary relative to the pair of clocks would not appear synchronized to observers moving relative to the clocks. This paper shows that Einstein's argument is seriously flawed because it relies on the readings of a pair of moving clocks that are constrained to work at an abnormal rate. If synchronization is independent of the observer and the reference frame, as this paper claims, there is a serious problem with the special theory.*

In his original paper on special relativity, Einstein[1] defined a procedure by which it can be determined whether two relatively stationary clocks are synchronized with one another. He considered two clocks A and B, at rest relative to one another, and considered a flash of light emitted from A and reflected back from B to A. If the reading on B at the moment of reflection is half-way between the readings of A at emission and return of the flash, the clocks are synchronized, according to Einstein's definition. The definition says, in other words, that the time taken for the light to travel from A to B, as measured by the synchronized clocks, is the same as the time taken for the light to return from B to A.

An important problem to be considered is whether an observer who is moving relative to the pair of clocks would agree with an observer who is stationary relative to the clocks, on the question of whether the clocks are synchronized. The definition itself does not mention any observer; it simply describes objective readings of the clocks when certain events occur. We can imagine, for example, that the test is done in darkness, so that the only clock readings that are visible are those of clock A at emission of the flash, clock B at reflection of the flash, and clock A again at the return of the flash. Any observer, whatever his or her state of motion, would see the same set of three readings and, using the definition, would know whether the clocks were synchronized. This conclusion is, however, not the one that is generally accepted: it is widely believed that clocks that are synchronized for one observer are not synchronized for a relatively-moving observer. It is the purpose of this paper to explore this problem.

***Einstein's argument, that clocks that are synchronized for a stationary observer are not synchronized for a relatively-moving observer, is incompatible with the strict interpretation of his definition of synchronization and represents a serious problem for the special theory.***

In his book *Science at the Crossroads*,[2] Herbert Dingle argued that synchronization does not depend on the observer; the following is an excerpt from his argument (pp. 152-153):

> The clocks are synchronised if the reading of the distant clock when it receives the signal is half-way between the readings of the standard clock at emission and return of the signal. It is, however, extremely common to read that, according to special relativity, clocks which are synchronised for one observer are not synchronised for a relatively moving observer. . .But it should surely be obvious that the readings of the clocks when they encounter the signal cannot depend in the least on who happens to observe them; their photographs could be examined afterwards by anyone at all, and it is the relation between those readings alone that determines whether the clocks are synchronised or not.

Dingle's criticism of synchronization was an important part of his argument in support of the claim that he made in his book, that Einstein's special theory of relativity contains a contradiction. In spite of the importance of his criticism of synchronization, critics have almost unanimously ignored it, and, in typical fashion, those who have referred to it are inconsistent with one another. To the best of my knowledge, the only reviewer of Dingle's book who mentioned the problem of synchronization was Stadlen,[3] and he agreed with Dingle that synchronization does not depend on the observer. After a brief paraphrase of the definition of synchronization, Stadlen went on to write: "Since the reading of a clock when it emits or receives a flash of light is a public event, all



New Energy Times Archive

observers will agree that the clocks are synchronized." This is inconsistent with an article by Hall,[4] who refers to Dingle by writing: "His troubles all stem from his insistence on the postulate that 'if two clocks are synchronized, then they are synchronized absolutely and for all observers.'"

When Hall's article appeared, I wrote a letter to the editor of the journal in which it was published, inviting Hall to review Dingle's argument and to identify the precise nature and location of what he claimed to be Dingle's error. The Associate Editor, after consulting Hall, decided not to publish my letter. One of the reasons Hall gave for not wishing to review Dingle's argument was that the issue had already been "beaten to death." This seems a strange reason for him to give, since he was the one who had resuscitated it. In fact, there has been very little discussion of the subject of synchronization as such. In order to stimulate further discussion of the subject, I took the opportunity to raise the matter recently in the course of a published debate.[5] The following discussion is based on the argument that I presented in that paper.

In his original paper, Einstein[1] presented an argument that purports to show that a pair of clocks that are synchronized for an observer stationary relative to the clocks are not synchronized for a relatively-moving observer. The argument seems to be a very strange one, and I would like to discuss it in some detail.

Einstein assumes that there is a string of synchronized clocks along the x axis of a reference frame that we may consider to be stationary, and assumes a pair of clocks A and B attached to the ends of a rigid rod that is aligned with the same axis and that is moving along the string of stationary synchronized clocks; each clock of the pair has an observer moving with it, and the purpose of the exercise is to find whether those observers would find that the stationary clocks were synchronized. These clocks A and B (not to be confused with the stationary clocks A and B that appear in the original definition) have the crucially important property that, in Einstein's words, they "synchronize with the clocks of the stationary system, that is to say that their indications correspond at any instant to the 'time of the stationary system' at the places where they happen to be."

The experiment consists in sending a ray of light from A to B, reflecting the ray from B back to A, and receiving the ray back at A. In order to examine the significance of the experiment, suppose that there are three stationary clocks O, P, and Q, which are along the x axis of the stationary reference frame in that order from left to right and have the following locations:

1. Clock A is at O (which we may consider to be at the origin of the stationary reference frame) when the ray of light is emitted from their joint location.

2. Clock B is at Q when the ray of light is reflected back from their joint location.

3. Clock A is at P when the reflected ray is received at their joint location.

It is obvious that the time taken for the ray to travel from O to Q is greater than the time taken for the reflected ray to travel from Q back to P. Now we consider the property mentioned above, that the moving clocks A and B "synchronize with the clocks of the stationary system," which obviously means that the reading on B (which is the same as that of Q) at the moment of reception is not midway between the readings of A at emission and reception (which are the readings of O and P respectively at the instants of emission and reception).

It was from that fact, that the reading of B is not half-way between the two readings of A, that Einstein concluded that, "Observers moving with the moving rod would thus find that the two clocks were not synchronous, while observers in the stationary system would declare the clocks to be synchronous."

I suggest that Einstein's conclusion was incorrect, since it had nothing to do with his definition of synchronization. If the observers at the ends of the moving rod want to find out whether the stationary clocks are synchronized, they should wait until the ray gets back to clock O in order to ascertain whether O and Q are synchronized, for example. There are three stationary clocks involved, and it is not possible to find from only three readings whether three separated clocks are synchronized. In any case, it should not be necessary to have three stationary clocks in order to find out whether the moving observers see them as synchronized or not: if there was only one pair of relatively stationary clocks in the universe, it should be possible for an observer in any state of motion to find out by direct observation whether they are synchronized or not. The observer need not possess a clock, since the criterion of synchronization depends only on the readings of the pair of clocks whose synchronization is in question, not on the readings of any other clocks.

Part of the problem is that the clocks A and B, at the ends of the moving rod, are very strange clocks, for they do not work as good clocks should. A very important result of the special theory of relativity is that, if the moving clock A were synchronized with O as it passed O, it would not also be synchronized with P as it passed P; it would lag behind P. In a similar way, the moving clock B would not remain synchronized with the adjacent stationary clock as it moved along the string. If the clocks are constrained to remain in synchronism with the adjacent moving clocks as they pass along, they are not acting as independent clocks but are simply reflecting the readings of the adjacent stationary clocks.

How did Einstein plan to keep the moving clocks A and B synchronized with the clocks of the stationary system as they moved along? He did not tell us. The following are some suggestions as to how that strange result might be accomplished:

1. The clocks could be adjusted in such a way that, when stationary, they run fast by just the right amount, so that when moving at the appropriate speed they would run at the same rate as the stationary clocks. If synchronized with an adjacent stationary clock at the moment of passing, such a clock would continue to synchronize with adjacent stationary clocks as it passed along the string.

2. Each clock could be controlled, by its own observer or by some other agent, in such a way as to over-ride the works of the clock and force its reading to correspond to the reading of the adjacent stationary clock at all times. In this case the works of the clock could be removed; it would be just as if a child turned the hands of a toy clock to match the reading of a real clock.

3. Since the readings of the moving clocks simply reflect the readings of the adjacent stationary clocks, the observer at each end of the moving rod could carry a mirror

McCausland continued on page 31



New Energy Times Archive

A Modified

# LORENTZ ETHER THEORY

Ronald R. Hatch*


## — Abstract —

The author has developed a "Modified Lorentz Ether Theory" (MLET), which is sometimes referred to as an "Ether Gauge Theory" (EGT). A brief logical development of MLET is presented, with each step in the development constrained by experiment. MLET provides a logical and easily understood alternative to both the "Special Relativity Theory" (SRT) and the "General Relativity Theory" (GRT). The new theory is particularly significant for its description of a simple mechanism for the gravitational force. Experiments either in progress or newly suggested are also described, which should either support or refute the new theory.


## — Introduction —

It appears ridiculous to many to talk about an ether as a light bearing medium. After all, an ether was ruled out almost 100 years ago by Albert Einstein. But even among those of us who question the relativity theories of Einstein, there are many who still scoff at the idea of an ether. This is true even though modern physics has ascribed a multitude of properties to space or to the "vacuum," which indicate it is far from simply the "absence of matter." Indeed, so many properties had been ascribed to the vacuum that by 1951 Whittaker[1] was already saying: "It seems absurd to retain the name 'vacuum' for an entity so rich in physical properties, and the historical word 'aether' may fitly be retained."

The strongest argument against an ether has always been the argument by Einstein that all inertial frames are equivalent. It is a strange ether indeed for which such a property could be true. However, Einstein's argument for equivalence was a positivistic argument. Specifically, he argued that there was no measurement which could distinguish one inertial frame from another. Then he made the common mistake of positivism and argued that absence of proof was proof of absence, *i.e.* that, since no measurement can be used to distinguish two inertial frames, there are no differences. It is argued in this paper that there is, in fact, an absolute inertial frame which is distinguished from other inertial frames by certain clear-cut properties. However, it is not argued that these distinguishing features can be directly measured—rather they are logical deductions resting on very good evidence. Since we reject Einstein's Special Relativity Theory (SRT) and the associated equivalence of all inertial frames, there is no reason not to return to the concept of a luminiferous medium, *i.e.* to an ether.

There are other basic reasons to return to an ether. The elimination of a physical medium for electromagnetic oscillations is part and parcel of the unwarranted transformation of physics during the twentieth century away from physical models to mathematical equations. In fact, Pauli[2] says the ether had to be given up ". . .not only because it turned out to be unobservable, but because it became superfluous as an element of mathematical formalism." But it has always been rather meaningless to talk of light as a transverse wave without having something to do the waving. Or as Tyndall[3] has so eloquently stated: "Ask your imagination if it will accept a vibrating multiple proportion—a numerical ratio in a state of oscillation." Let us return to a physics that involves physical things. Viva la ether.

## — First Principles —

It must be admitted that several historical problems with a luminiferous ether existed. Let us briefly address some of these. First, the polarization of light indicated that electromagnetic waves were transverse and hence implied an elasticity of shear in the transmitting medium. But shear waves are impossible in a gas and very unusual in any fluids. A solid medium is implied. But, if a solid, then how can material particles move through it? As we shall see below, the solution lies in a new understanding of material particles.

A second problem was that common bulk elastic materials that sustain shear waves also sustain a second compression-rarefaction volume wave which typically travels at a different velocity. But no physical analog to such a longitudinal compressive wave has ever been found. Further, those models of an ether, absent such waves, were generally unsuccessful in modeling the characteristics of light. One of the most successful models was proposed by McCauley. He simply proposed by fiat an ether which was elastic in rotations only. In my book[4] I proposed a variation of McCauley's ether in which electromagnetic waves correspond to a combined shear and volume elasticity whose oscillations were in phase, *i.e.* the point of maximum compression and of maximum shear are coincident. Out-of-phase oscillations of shear and volume result in standing waves and correspond to material particles.

Having allowed a luminiferous ether, we can put it to work to provide a number of other physical models. The quantum theory and its probability waves are easily transformed into standing waves in that very same ether. In fact, we can eliminate Bohr's ridiculous principle that all matter is simultaneously a wave and a particle. Instead, particles are recognized as stable standing waves (of out-of-phase shear and volume oscillations) in the ether and are not mathematical points in space. With this understanding, it is not difficult to see why matter can move freely in solid ether. Moving matter is simply a standing wave in motion.

## — Gravitational Effects —

The basic ether physical model described above can be developed further in a step-by-step process using experi-



New Energy Times Archive

mental evidence together with fundamental elastic solid concepts. But, rather than addressing first the velocity effects which Einstein addressed in his Special Relativity theory, we find it much simpler to address the gravitational effects first. In our model, gravitational effects are actually simpler than the velocity effects.

With a standing wave model of matter, gravitation, instead of being one of the most mysterious forces of nature, becomes one of the most easily understood. If a particle, such as an electron, consists of a standing wave structure of oscillating shear and density variations in the ether, it stands to reason that the reaction time of the ether (which reacts at the limited velocity of $c$) will cause the internal ether density of that standing wave to be reduced. This means that the ether density external to the particle or standing wave must be increased. The ether external to the particle will have an increased density that will be distributed approximately inversely proportional to the distance from the center of the particle. It is the gradient of that ether density which gives rise to gravitational phenomena. Let's see how this model of gravitation fits the experimental facts.

### — Speed of Light in a Gravitational Potential —

The speed of light varies in a gravitational potential. Einstein's General Relativity Theory (GRT) predicted this; but, more important, Shapiro *et al.*[5] and Reasenberg *et al.*,[6] using radar reflections from Venus and Mercury during superior conjunctions, have measured it. These experiments confirmed the prediction of the GRT that the speed of light would slow as the square of the gravitational scale factor. Einstein gave a gravitational scale factor "s" of

$$s = \sqrt{1 - \frac{2GM}{rc^2}} \qquad (1)$$

which is approximately equal to one but becomes slightly smaller as the gravitational potential decreases.

Some have questioned Shapiro's results on the basis that the relative accuracy of the orbits of Earth and the planets Mars and Venus are not known with enough accuracy to support the determination of the amount of slowing of the speed of light as the rays pass close to the Sun. However, Shapiro's method does not depend upon accurate knowledge of the orbits—it depends on the fact that orbits do not have pimples. (*i.e.* Orbits are smooth trajectories and objects in orbit do not suddenly change direction.) The expected change in the measured two-way time delay for a radar pulse to reach the planet and return has been computed very precisely. (See Figure 1.) Reasenberg *et al.* made time-delay measurements which fit this expected change very accurately. In the case of Venus, if one were to try to explain the effect via a modified orbit of either Earth or Venus without any change in the speed of light, one would need an orbit with an anomalous hump or pimple of approximately sixty kilometers pointing directly away from the Sun. Only a speed of light change proportional to the square of the gravitational scale factor fits the data accurately. The original experiments had a noise level of approximately 5% of the expected effect. Using two frequencies to remove the refraction effects of the Sun's atmosphere and a transponder to remove terrain effects of the reflecting planet have reduced the noise to approximately 0.2% of the total effect.

If the slowing of the speed of light with gravitational potential cannot be detected locally (and it cannot), then either local clocks must run slower or the lengths of physical objects must decrease with gravitational potential—or both. Other experiments are needed to clarify the effects of gravitational potential on clocks and lengths.

### — Clock Rate in a Gravitational Potential —

The General Relativity Theory (GRT) predicts a gravitational red-shift of electromagnetic radiation which moves upward in a gravitational potential and a gravitational blue-shift for such radiation moving downward. The typical GRT textbook uses the equivalence principle to derive the effect and ascribes it to gravity acting on the photon as it traverses the path. It is instructive to see how the equivalence principle is used to obtain the effect. The derivation by Ciufolini and Wheeler[7] is typical and proceeds as follows: One starts with a mass $m$ at rest at a specific gravitational potential. Its energy is then given by its rest mass energy, *i.e.* by $E = mc^2$. Then it is allowed to fall a distance, $d$. Falling causes its total energy to increase by approximately $1/2\ mv^2$ or in terms of the gravitational force by $GMmd/r^2$. If we convert the energy at the lower point into radiation, beam it upward, and then, after it rises a distance, $d$, reconvert it to mass, we have completed a cycle in which the energy must be conserved. This means that, as the radiation rises, it must lose the energy picked up as the particle fell—else one would have a mechanism for creating or destroying energy. Thus, the frequency must decrease by the scale factor, $s$, as the photon rises.

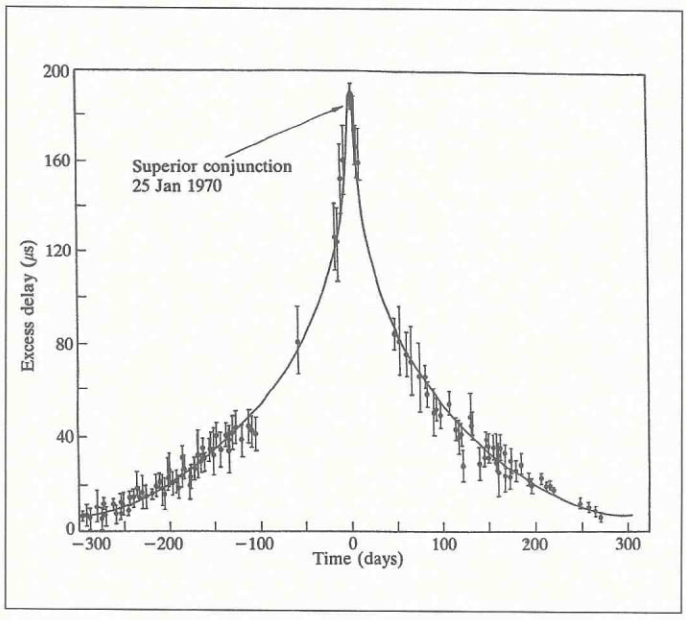



**Figure 1.** A sample of post-fit residuals for Earth-Venus time-delay measurements: ——, prediction using GR (Shapiro *et al.* 1972). (Courtesy Professor Shapiro and *Physical Review Letters*, published by the American Physical Society.)

New Energy Times Archive

Though I claim that there is a significant fault with this derivation, the net effect is clear and has been verified by a number of experiments. The Pound and Rebka[8] experiment and Pound and Snyder[9] experiment were among the first to verify the effect. Gravity Probe A or the Vessot[10] experiment was the first large-scale experimental verification of the effect.

But do the intrinsic rates of the emitter and receiver clocks change in frequency, or is it the light signal that changes frequency during its flight? Clifford Will[11] claims that it does not matter and that there is no operational way to distinguish between the two descriptions. In fact, he claims that it is impossible to determine unambiguously whether the shift is due to the clocks or to the signal. He says that the signal is shifted and that to ask for more information ". . .is to ask questions without observational meaning." This seems like a ridiculous stance to take when in the very next paragraph he admits that we can tell that clocks are directly affected by the gravitational potential. This is accomplished by taking one of two identical clocks to a higher potential, letting it run for awhile and then bringing it back and comparing the elapsed time with the clock which was not moved. This is quite similar to what was actually done by Hafele and Keating.[12] They flew atomic clocks around the world, both east and west on commercial airplanes. The measured clock rates fit a pattern which required an adjustment for both a velocity effect on the clocks and for a gravitational potential effect on the clocks.

So why does Will so strenuously tell us that we cannot tell whether it is the clocks or the signal in flight that changes frequency? One suspects the following reason. As soon as one recognizes that it is the clocks rather than the signal in flight which changes frequency, it becomes apparent that the equivalence principle argument described above is faulty—for the equivalence principle indicated that the signal in flight changed frequency. I believe that the fault is in the first premise of the equivalence argument. Particles in free fall do not pick up (magical) energy from a gravitational field—instead the rest-mass (structural) energy is decreased by conversion into kinetic energy. This will be explored further below.

There is substantial evidence that the frequency (cycles) in transit is preserved. This is compatible with the gravitational frequency shift observed only if the clocks are affected directly by the gravitational potential as the Hafele and Keating experiment indicates. The GPS tracking-station clocks verify this direct effect of the gravitational potential upon the clock rate. The tracking-station clocks require adjustment for their height above sea level. Interestingly, they do not require adjustment for their latitude. The oblateness of the Earth due to its spin rate is such that the effect of the extra gravitational potential (greater equatorial radius) upon clocks at the equator is precisely cancelled by the greater equatorial spin velocity effect upon the clocks.

The evidence is unambiguous. Clock frequency scales directly with the first power of the gravitational scale factor. But we know that the locally observed speed of light is always unchanged even though it is affected by the square of the gravitational potential. But, if local clocks are affected by only the first power of the gravitational potential, this implies that the length of physical objects also changes with the first power of the gravitational potential.

### — Length in a Gravitational Potential —

It is time to recap our conclusions so far and to solidify them by writing the corresponding equations. From the Shapiro experiments we know that the local speed of light is given by:

$$c_l = \lambda_l f_l = c_\infty s^2 = \lambda_\infty f_\infty s^2 \qquad (2)$$

where $s$ is the gravitational scale factor and the subscript "$l$" means the local value and the subscript "$\infty$" means the value at a far distance from the gravitating mass.

From the combined clock and frequency experiments we know that the local clock frequency is given by:

$$f_l = f_\infty s \qquad (3)$$

By simply plugging Equation 3 into Equation 2 we can get the effect of gravitational potential on the lengths of physical objects and, as suggested above, this leaves us with a first power dependence on the gravitational scale factor.

$$\lambda_l = \lambda_\infty s \qquad (4)$$

Before looking to verify this result with experimental data, it is important to recognize that Equation 3 applies to local clocks—but not to frequencies received from distant sources. As stated above, the evidence is that the frequency of a signal in transit remains unchanged. Thus, for frequencies in transit from a source far removed from a gravitational source, the frequency received is the frequency transmitted.

$$f_r = f_\infty \qquad (5)$$

But when this equation is plugged into Equation 2, it becomes apparent that the received wavelength is shortened by the square of the gravitational scale factor.

$$\lambda_r = \lambda_\infty s^2 \qquad (6)$$

Now we can verify the result of Equation 4. The Brault[13] experiment measured the wavelength received on the Earth of the sodium spectrum line generated on the Sun. Since the measured comparison is between the local wavelength and the received wavelength, the expected result can be obtained by substituting Equation 4 into Equation 6. The result is:

$$\lambda_r = \lambda_l s \qquad (7)$$

And that is precisely what Brault measured. The received wavelength for the sodium line showed the expected dependence upon the gravitational scale factor. Of course, since the gravitational scale factor pertaining to the Brault experiment is the combined Sun and Earth gravitational scale factor, which is larger at the Earth than at the Sun, the observed wavelength for the sodium line is increased.

New Energy Times Archive

### — Mass and Energy in a Gravitational Potential —

The dependence of clocks (apparent time) and of lengths upon the gravitational scale factor has been derived with the help of solid experimental data. It remains to find the dependence of mass upon the gravitational scale factor. But this last step is not difficult and was suggested by the equivalence principle results above. We now know that the frequency of light in transit is not affected by the gravitational potential. We will verify later that Planck's constant is not affected by the gravitational potential. Hence the energy of a photon is not affected by the gravitational potential. But, if all this is true (and it is), the equivalence principle, if valid, requires that the total energy of a particle falling in a gravitational potential not be affected by the gravitational scale factor. This is an interesting requirement.

Let us see where this requirement leads. It is easy to show that the kinetic energy, $K$, of a particle falling from a great distance in a gravitational potential is approximately equal to the rest-mass energy, $E$, multiplied by one minus the gravitational scale factor. Thus,

$$K_l = m_\infty c_\infty c_\infty (1 - s) = E_\infty (1 - s) \tag{8}$$

But, if the total energy of the falling particle is to remain unchanged, this means that the local rest-mass energy must depend directly upon the gravitational scale factor.

$$E_l = E_\infty s = m_\infty c_\infty c_\infty s \tag{9}$$

Clearly this gives the required result since the sum of the local rest-mass energy and the local kinetic energy now sum to the original rest-mass energy.

The result of Equation 9 is further verified by the fact that the energy of radiation of an atom at rest at any point in a gravitational potential also satisfies Equation 9 (assuming that Planck's constant is unchanged) because that is the requirement of the previously verified Equation 3.

But Equation 9 together with Equation 2 reveals the local dependence of mass on the gravitational scale factor.

$$E_l = m_l c_l c_l = m_\infty s^{-3} c_\infty s^2 c_\infty s^2 \tag{10}$$

This shows that the mass increases as the gravitational potential decreases. In fact, the mass increases as the inverse third power of the gravitational scale factor.

One more result is needed to tidy-up our derivation. Plugging in the unit changes for frequency, length, and mass into Planck's constant shows that the constant does not vary with the gravitational potential. Though it may appear to be circular reasoning, it is not, for one can show that other choices of gravitational dependence of mass and Planck's constant do not yield consistent results.

### — MLET versus GRT—

The developments so far are tightly constrained by experiment. A short sidetrack is inserted here to show that the new theory deviates slightly from existing theory. Furthermore, this deviation seems to be supported by existing experimental evidence, and experiments could be conducted to refute or verify the theory at this point. Most of the results in this section can be found in expanded detail in an earlier paper.[14]

The first step is to note that the radial spatial derivative, d/dr, of the local rest-mass or structural energy, as given in Equation 9, should result in the equation for the gravitational force—and it does, almost. The force equation so obtained is:

$$F = \frac{GMm}{r^2 s} \tag{11}$$

Note that the above derivation of the gravitational force not only yields a slightly different value (the gravitational scale factor in the denominator), but also gives a new explanation for what causes gravity. The cause of gravity is the radial gradient of the rest mass or structural energy, *i.e.* the dependence of the structural energy upon the gravitational scale factor. It is also noteworthy that this derivation indicates that gravity does not act on kinetic energy or its mass equivalent. Gravity is a 100% efficient converter of upward kinetic energy into structural energy and a 100% efficient converter of structural energy into a downward kinetic energy.

However, there is a problem with Equation 11, specifically the presence of the gravitational scale factor in the denominator results in a disagreement with the precession of the perihelion of Mercury. In fact, as pointed out in the prior paper, it results in a precession term of the wrong sign. This indicates an error in Einstein's gravitational scale factor as given in Equation 1. A new, slightly different, gravitational scale factor is needed to fit the precession of Mercury—that new scale factor is

$$s = \exp\left(-\frac{GM}{rc^2}\right) \tag{12}$$

When this new expression for the gravitational scale factor is used in Equation 9 and the spatial derivative is formed, a new force equation with the gravitational scale factor in the numerator is obtained.

$$F = \frac{GMms}{r^2} \tag{13}$$

When one expands the expression for the gravitational scale factors as given in the two Equations 1 and 12, one finds that the sign of the second-order term has changed. The effect is extremely small in weak gravitational fields such as the Sun's or the Earth's but becomes very significant as the strength of the gravitational field becomes stronger. In fact, the presence of the gravitational scale factor in the numerator of Equation 13 not only corrects the sign of the gravitational precession term but it also shows that the gravitational force is self-limiting. Thus, black holes, so popular in today's literature, are ruled out.

There are three other factors which rule strongly for the new gravitational scale factor given in Equation 12. First, the exponential decay of the excess ether density is precisely what one would expect from an elastic solid ether,

New Energy Times Archive

*i.e.* it is the natural factor which balances pressure across a spherical surface. By contrast, the original gravitational scale factor seems arbitrary and heuristic. A second reason for preferring the exponential form has been given by Montanus.[15] He points out that the gravitational mass can be split into a number of shells of sub-masses. When this is done, the gravitational scale factor should compound multiplicatively while the mass is added together. The exponential form of the scale factor satisfies this requirement, but the original Einstein form of the scale factor does not. Finally, Van Flandern[16] has cited evidence that optical data regarding planetary orbital periods over the last century disagree slightly with the more recent radar and transponder determined periods. But the radar and transponder range measurements are converted into orbital periods using the standard inverse square law. Using the new force law brings them into close agreement.

So our force derivation has left us with 1) a new explanation of gravitational force (spatial gradient of the rest-mass energy), 2) a new gravitational scale factor, 3) a new gravitational force Equation, 4) elimination of black holes, and 5) agreement with planetary rotation rates. But these accomplishments are not all. With the scale factor $s$ increasing as the distance from the center of the gravitating mass increases, the force will appear to increase over the standard inverse square model ($s$ in the numerator becomes larger). Thus, this new force equation may explain the star rotation profile of galaxies without the need for WIMPS, MACHOS, or any of the other strange mass halos required by modern physics to explain the excess rotation on the outer edges of the galaxies.[17] In addition, the anomalous red shift of super-giant O-B stars[18] may be due to the fact that these large stars have stronger gravitational potential than previously recognized. The mass of these stars is estimated by observing the orbital period of binary pairs. But the mass so obtained depends upon the currently accepted inverse square law, which leads to a lower estimate of the mass and hence a lower estimate of the gravitational red shift.

There is much that favors the new gravitational scale factor and force equation. So how can it be tested? My suggestion is to launch one or more planetary probes in which a test mass is flown inside an outer spacecraft which protects the inner test mass from drag and radiation forces. Using the displacement of the inner mass to sense when to accelerate, the outer spacecraft would allow very precise measurements of the gravitational force and its distance dependence.

### — Velocity (Speed) Effects —

The understanding of gravitational effects upon clocks (time), length, and mass can be used to help us understand the effects of velocity or speed upon the same physical parameters. But, when velocity is considered, we are forced to ask, "Velocity with respect to what?" The answer proposed is velocity with respect to an absolute ether frame of reference.

The Modified Lorentz Ether Theory (MLET) obviously involves a special absolute frame—the frame of the stationary ether. An absolute frame of reference denies the equivalence of all inertial frames, which is anathema to those who believe the Special Relativity Theory (SRT) is correct. The believers of SRT have chosen their own absolute—the absolute equivalence of all inertial frames. While it is true that there is no measurement which can be used to distinguish the absolute ether frame from any other inertial frame, this is not the same as making the positivistic statement that all frames are equivalent. Absence of proof is not proof of absence.

Mansouri and Sexl[19] showed that an ether frame with clock slowing and length contraction was mathematically equivalent to SRT. Yet, because it destroyed the equivalence of all inertial frames, they rejected the ether solution as a viable alternative. The ether alternative allows a physical description of physical phenomena. SRT gives a mathematical description of physical phenomena—which often seems to involve magic as far as physical description is concerned.

While MLET claims physical consequences as a result of movement with respect to the absolute ether frame of reference, it also recognizes that there is no way to determine exactly which inertial frame corresponds to this absolute ether frame. The frame which is defined by the Cosmic Background Radiation (CBR) is a natural choice as the ether reference frame because it is presumably a unique frame unambiguously defined in all parts of the universe. However, some claim that the CBR is not universal and not a remnant of the Big Bang—and there is no way to refute their claim. In any case, MLET does not require that we know which frame is the absolute ether frame. Practically, to use MLET we need to simply select an inertial frame which we will presume is the absolute ether reference frame with isotropic light speed.

### — Effective Speed of Light — Relative to a Moving Standing Wave

The first parameter studied to determine the effect of a gravitational potential was the speed of light. The speed of light will also be considered first in determining the effect of velocity. But no experimental evidence is needed at this point—good mathematical logic applied to the problem is all that is required. At any physical point in a standing wave in an elastic ether, the density of the ether can change by a flow of ether in any direction. The rate at which the ether responds is at the speed of light. We can logically expect then that a standing wave will have internal dynamics governed by the two-way speed of light relative to that standing wave. When the standing wave is moving at a velocity of "$v$," the two-way velocity of light will be reduced relative to it. In fact, the two-way velocity of light will be different in the longitudinal and transverse dimensions. Specifically,

$$c_a = \frac{c_s}{\gamma^2} \qquad c_t = \frac{c_s}{\gamma} \tag{14}$$

where the "$a$" subscript is used to designate the along-track or longitudinal velocity and the "$t$" subscript the transverse. The $s$ subscript is used to designate the stationary result; $\gamma$ is the velocity scale factor, which has a value of one when the velocity is zero and approaches infinity as the velocity approaches the speed of light. It is given by:



New Energy Times Archive

$$\gamma = \frac{1}{\sqrt{1-\frac{v^2}{c^2}}} \tag{15}$$

The effect of velocity is thus quite similar to the effect of decreased gravitational potential (increased ether density). However, it is complicated a bit by a dimensional dependence.

### — Slowing of Clocks with Velocity —

Clocks tick slower when moving. SRT ascribes this slower clock ticking to relative motion. MLET ascribes the slowing to movement relative to the absolute frame—or, in practical terms, movement relative to a defined isotropic light-speed reference frame. Both relativist and dissident generally acknowledge clock slowing, though the relativist likes to call it time slowing, which most dissidents strongly contest. The amount by which the clock frequency slows with motion is:

$$f_m = \frac{f_s}{\gamma} \tag{16}$$

where the subscript "*m*" designates the frequency when in motion (no longitudinal or transverse distinction needed) and the "*s*" the frequency when stationary.

The experimental foundation for clock slowing with velocity is very solid. The Ives and Stillwell[20] experiment was perhaps the first experiment with significant accuracy to show the clock-slowing effect. (It should be noted that Ives expected to measure a clock-slowing effect, but he was a strong opponent of SRT, publishing many articles against SRT in the *Journal of the Optical Society*.) There are, of course, many modern experiments which also support the slowing of clocks with velocity. Indeed, the modern Global Positioning System (GPS) has to account for clock slowing with velocity in its everyday operation. We will return to a discussion of the clock slowing within the GPS when we consider mass and energy effects below.

### — Length Contraction with Velocity —

As was done with the gravitational potential, it is now possible to derive the length-change effects simply by knowing that the apparent (two-way) velocity of light is unchanged in the moving environment. Since the speed of light is the product of the wavelength and the frequency, we can use Equations 14 and 16 to give us the longitudinal and transverse change in lengths.

$$\lambda_a = \frac{c_a}{f_m} = \frac{c_s}{f_s\gamma} \qquad \lambda_t = \frac{c_t}{f_m} = \frac{c_s}{f_s} \tag{17}$$

Thus, we see that the longitudinal distance is contracted while the transverse distance remains unchanged.

While it is acknowledged that there is no direct experimental method which has been discovered to verify the change in length with motion, there is lots of indirect evidence. The Michelson-Morley experiment is, of course, the first experiment which implied length contraction because of its null results. Actually, the Michelson-Morley experiment only determined the relative length contraction between the longitudinal and transverse arms, because the two arms were of the same length. The Kennedy-Thorndike experiment completed the experimental evidence by showing the results were still null when one arm was made much longer than the other.

It should be noted that any two of the above results imply the third. If our argument concerning the two-way velocity of light was unconvincing, you can obtain the result from the experimental evidence for length contraction and clock slowing.

### — Mass and Energy Change with Velocity —

As was evidenced above for the gravitational case, when the speed of light slows, the rest-mass energy can decrease even as the mass increases. Clearly mass and energy need to be considered separately and structural (rest-mass) energy needs to be considered separate from the kinetic energy and total energy. An atom at rest emits lower frequency radiation when an electron changes orbital state if that atom is at a lower gravitational potential. This means that the frequency emitted decreases as a function of the structural or rest-mass energy. This fact, together with abundant experimental data, shows that the structural energy decreases with velocity.

Two different kinds of experimental data from the Global Positioning System (GPS) show that the structural energy decreases with velocity by an amount proportional to the inverse of the velocity scale factor. The first piece of evidence comes from the clock behavior on the individual GPS satellites. When a GPS satellite is in an eccentric orbit, it has a clock slowing (compared to the mean clock rate) near perigee due to the lower gravitational potential and an exactly equal amount of clock slowing due to the increased velocity at perigee. Since the gravitational slowing is due to a decrease in the structural energy with gravitational potential, the velocity slowing must be due to an additional structural energy decrease with the increased velocity.

This mechanism is substantiated by the behavior of the GPS clocks at the tracking stations. All clocks at sea level run at the same rate independent of latitude. But the Earth has an ellipsoidal shape and clocks at the equator are farther from the center of the Earth than a polar clock would be. This means that clocks at the equator should run faster due to the increased gravitational potential and, hence, should have a higher structural energy. However, the increased spin velocity at the equator results in a lower structural energy; and the slower clock rate exactly cancels the gravitational increase. In these two examples, it is clear that velocity lowers the structural energy.

When a material particle is accelerated and the structural energy decreases, what happens to this energy? I believe that the true kinetic energy is actually twice that conventionally assigned to it. Thus, the true kinetic energy is *mvv*, which is twice the conventional amount. The energy used for acceleration is only half this amount

New Energy Times Archive

because an additional equal amount is supplied by the structural energy decrease. The equations which define the structural energy, $E$, the total energy, $T$, and the kinetic energy, $K$, are:

$$E_m = \frac{E_s}{\gamma} = \frac{m_s}{\gamma}c^2 = m_m c^2 \tag{18}$$

$$T = E_s\gamma = m_s\gamma c^2 = m_m\gamma^2 c^2 \tag{19}$$

$$K = T - E_m = E_s(\gamma - \frac{1}{\gamma}) = E_m(\gamma^2 - 1) \cong m_m v^2 \tag{20}$$

where the $m$ subscript indicates the moving value and the $s$ subscript the stationary value.

From the above, it is apparent that the structural mass and the structural energy decrease when a particle is put in motion. However, the total energy and, therefore, the inertial mass (where the inertial mass is the total energy divided by the square of the speed of light) increases with velocity.

Marmet[21] has claimed that when the energy of a particle decreases, its size increases. He supports this claim with long experience in quantum mechanics. However, for both the gravitational and velocity effects, we have found that the size of the particle decreases. How can this be? The answer is quite simple. Since we believe that matter is made up of standing waves, the standard of length must be the distance that the speed of light moves in a specific interval of time. Thus, after we take the change in the speed of light into consideration, we find that the size relative to the distance the speed of light travels in a specific interval has indeed increased. This increases the time required for light to move from one edge of a particle to the other (and back) and explains why clock intervals are increased (clock frequency decreased).

## — MLET versus SRT —

A brief summary of some observable differences between the Modified Lorentz Ether Theory (MLET) and the Special Relativity Theory (SRT) is in order.

The most important difference is in the presuppositions, *i.e.* what was chosen as absolute. The MLET chooses an absolute ether frame and thereby obtains an absolute time simultaneity. The SRT chooses the absolute equivalence of all inertial frames (*i.e.* symmetry) and thereby obtains the relativity of simultaneity. The implications of these differences have been explored in an earlier paper,[22] but some of the most significant experimental differences will be considered briefly. The theoretical differences are best illustrated by the way the two theories explain two experimental results, specifically, Thomas precession and the Sagnac effect.

Before tackling the Thomas precession, a discussion of the Lorentz transformation between inertial frames needs to be addressed. In MLET the Lorentz transformation serves as a useful and practical "as if" transformation. It is useful in transforming an experiment from one inertial frame (chosen as the absolute frame with isotropic light speed) to another choice for the absolute frame. Since there is no way to detect the correct absolute ether frame, it is convenient in many applications to arbitrarily choose a specific frame as the absolute ether frame. One arrives at the Lorentz transformation in a two step process. First, one scales the lengths and clocks of the moving frame by the appropriate velocity scale factor, *i.e.* by Equations 16 and 17. (The mass scaling is generally ignored but can be important in some experiments.) This first scaling gives rise to the Tangherlini or Selleri transformations, which are reciprocal rather than symmetrical. This transformation to the moving frame adjusts for the new length scale and time (clock) scale but does not otherwise affect the speed of light, *i.e.* the speed of light in the moving frame is not isotropic. But, if one uses Einstein synchronization (or most other methods of clock synchronization which do not account for the non-isotropic light speed relative to the moving frame), the clocks will become biased by exactly the amount required to make it appear as if the speed of light is isotropic in the moving frame. When the clock bias is added to the Tangherlini or Selleri transformations, they become identical to the Lorentz transformation.

However, the SRT treats the Lorentz transformation not only as a necessary mapping from one inertial frame to another but also as a hyperbolic rotation in four-dimensional space-time which occurs automatically any time an observer or instrument is accelerated. Thus, in SRT infinitesimal Lorentz transformations (referred to as Lorentz boosts) are valid. They are valid because the SRT teaches that the speed of light is naturally isotropic in the new frame. Synchronization in the SRT is simply used to remove any clock biases—not to set biases so that the speed appears to be isotropic. Lorentz boosts are not valid in MLET since there is no requirement to treat the inertial frame of a receiver or observer as the absolute ether frame or that the speed of light be isotropic in the particular frame which they occupy. It is this difference in the way MLET and SRT treat the effect of acceleration on the speed of light which is critical in the explanation of the Thomas precession effect.

### *Thomas Precession*

SRT explains the Thomas precession of the electron as the result of a continuous succession of Lorentz boosts as the electron orbits the nucleus. Since the boosts are not in the same direction, the effective reference frame of the electron rotates. Since the spin axis of the electron, which defines its magnetic dipole field, is claimed to be relative to this effective reference frame, the magnetic dipole field will appear to have an anomalous precession. For comparison with the MLET explanation, it is important to note that a steel bar spun in a circular orbit by a wire attached to its mid-point would also suffer Thomas precession if it could be spun fast enough to get a measurable effect.

The MLET explanation is more mundane. The effect occurs only if the object being orbited is itself spinning. For example, a spinning bicycle wheel in orbit around a center point, where the accelerating force is applied to the wheel axle (axis), would suffer Thomas precession of the wheel axle. The mechanism is two-fold. The portion of the wheel whose component of spin velocity is aligned with and in the same direction as the orbital velocity will 1) increase in inertial mass and 2) its length will be contracted. Both of these effects are

New Energy Times Archive

proportional to the product of the two velocities (*i.e.* there is a component which is linear in the spin velocity). These two effects increase the mass inertia of the half of the wheel where the spin velocity adds to the orbital velocity and decrease the mass inertia of the half of the wheel where the spin velocity subtracts from the orbital velocity. This creates a mass imbalance with respect to the wheel spin axis. Since the spin axis is where the orbital force is applied, a torque will be present which will result in the Thomas precession.

Both the SRT (with General Relativity theory) and MLET claim that gravitational forces will not result in Thomas precession. Einstein's General Relativity theory (GRT) claims that gravitation is not really a force. Instead, objects in a gravitational field are simply following straight line geodesics in curved space-time. MLET claims gravity does not cause Thomas precession since the gravitational force acts on the center of mass, not on the center of spin. Thus, the center of mass offset from the center of spin has no effect. (I have never seen a relativity explanation as to why the Lorentz boosts do not apply to the orbiting Earth with respect to Thomas precession but does apply with respect to stellar aberration.)

For Thomas precession, it is unlikely that any experimental resolution as to which explanation correctly fits the phenomena will be forthcoming. However, since the SRT also embraces length contraction and inertial mass increase,[23] it is hard to see, using the SRT explanation, why the effect should not double if the orbiting object is itself spinning. In any case, the Thomas precession explanation makes the issues involved in attempts to explain the Sagnac effect clearer.

*Sagnac Effect*

The original Sagnac experiment showed that the light travel time around a closed path is different one way than the other if there is rotation in the plane of the optical paths. Optical gyros use the Sagnac effect to measure rotations along an axis perpendicular to the plane of the light path.

No one can claim that the Thomas precession is not a result of rotational acceleration, yet the only explanation for it comes not from the GRT but from the SRT. It is claimed to be the result of Lorentz boosts. By contrast, it is generally claimed that GRT rather than SRT is required to explain the Sagnac effect. The reason for this about face seems clear. If one uses Lorentz boosts in an attempt to explain the Sagnac effect as a rotary phenomenon, the speed of light should be isotropic at every point in the rotating experiment and a null result is predicted. In other words, applying SRT to the Sagnac effect in the same way it is applied to explain Thomas precession predicts that optical gyroscopes will not work—yet they work just fine.

The now classic paper by Post[24] on the Sagnac effect appears to be a compromise. Post claimed that the GRT had no role in explaining the effect. Instead, he arbitrarily postulated a new phenomenon—rotating a light beam has an unexplained but real effect on the speed of the light.

But the claim that the Sagnac effect is even dependent upon a rotary phenomenon is itself contested. Ives[25] proposed an experiment in which the light source and detector moved along the straight side of a polygon. He claimed that this would prove that the Sagnac effect is not a rotary phenomenon. Recent evidence from interplanetary probes and from the Global Positioning System (GPS) have verified Ives' claim. Yet, in the face of overwhelming evidence to the contrary from GPS, Ashby[26] claims that it is a rotary effect. Newton showed with the example of water in a spinning bucket that rotational motion is absolute and not relative. Thus, by claiming that the Sagnac effect is a rotary phenomenon, Ashby can admit that the Sagnac effect is caused by an unequal velocity of light along the two light paths and do so without directly contradicting SRT postulates.

But GPS range adjustments for the Sagnac effect prove that it is not a rotary phenomenon. To get precise navigation results, the GPS measurements must use a velocity for the speed of light which is equal to the vacuum speed of light, $c$, minus the mean velocity component, $v$, at which the receiver is moving away from the satellite source. The path over which the mean velocity of the receiver is computed during signal transit time does not affect the result. It may be circular or along a straight line. The electromagnetic signal follows a straight line path from the satellite at the instant of transmission to the receiver at the instant of reception. Clearly the light path does not depend upon whether or not the receiver was undergoing rotary motion.

The MLET explanation for the Sagnac effect is simple and easily understood. In MLET all measurements and adjustments are made in the frame chosen as the absolute reference frame with isotropic light speed, which in the case of GPS is the non-rotating Earth-centered frame. Adjustments for GPS satellite and receiver clocks are made for their gravitational potential and velocity in this frame. Because the receivers are moving in this frame (at least due to the Earth's spin rate), the velocity of the satellite signal with respect to the receiver will not be $c$ and will not be isotropic. Instead, the signal velocity relative to the receiver will be a function of the speed of light and the velocity of the receiver within the isotropic light speed frame. Thus, the Sagnac effect must be removed to obtain the correct range to the satellite and to get the correct navigation solution. MLET says the Sagnac effect is present because the speed of light remains isotropic in the chosen frame and not isotropic relative to the receiver.

The Thomas precession and the Sagnac effect illustrate the earlier claims regarding SRT and MLET. SRT assumes that, when the velocity of an observer or instrument changes, the observer is automatically in a different frame of reference and the speed of light relative to that observer automatically becomes isotropic relative to that observer or instrument. MLET by contrast works with only one frame of reference at a time. Movement within the frame by either receiver or observer does not automatically affect anything other than the receiver or observer clock rate, length, or mass. The speed of light is not directly affected. The only way to obtain a speed of light of $c$ that is isotropic with respect to the observer or instrument is to rescale the length, and time (clock) units to the moving observer's units and then to recalibrate the clock biases (including the light source clock) into that new frame.

The experimental evidence is almost overwhelming in support of the MLET view. There is a large disjoint between the SRT theorists and the experimentalists. The SRT theorists continue to claim that the speed of light is automatically the velocity $c$ and isotropic with respect to the moving observer

New Energy Times Archive

or experiment. But the SRT experimentalists do what is necessary to explain and make sense of the measurements. The equations for tracking and navigating the interplanetary probes developed by the Jet Propulsion Laboratory (JPL) for NASA[27] clearly follow the MLET template. A Sun-centered isotropic light speed frame is used and all clock rates are adjusted for their velocity and gravitational potential in that frame. In addition, the Sagnac corrections for both orbital and spin velocities are routinely applied. Similarly, the equations used in VLBI have been developed for both an Earth-centered non-rotating frame and for a Sun-centered frame. Comparing these equations clearly shows that the MLET viewpoint is the correct one. The only evidence which seems to support the SRT theoretical view is the Thomas precession; and, as we have seen, there is a good alternate MLET explanation which actually uses a real torque (rather than a mathematical expression) to stimulate the precession.

The famous twin or clock paradox illustrates the conflict of SRT theory versus experiment. It seems that the most popular of many competing SRT theoretical resolutions is that, when the traveling twin turns around, he stimulates a four-dimensional hyperbolic rotation of space-time, which causes any signals in transit anywhere in space to adjust to his new coordinate frame and new light speed. This means that the positions and frequencies of all such signals will magically move to meet his new time and position coordinates in his new inertial frame. By contrast, MLET recognizes that the velocity of light has not really changed. Specific clock biases and a new length standard simply cause the speed of light to appear the same in a new frame. The MLET equations for the twin or clock paradox follow the same equations used by JPL for the interplanetary probes. Pick any isotropic light speed frame you wish, then adjust all clock rates for their velocity in that frame—both going and coming. But do not adjust the speed of light. Let the relative velocity be determined by the composite of the speed of light and the observer velocity. There is no paradox. The traveling twin will return younger and by the same amount in any isotropic light speed frame you pick.

I believe that the experimental evidence already existing is sufficient to convince any unbiased observer that the MLET explanation for velocity effects is superior to the SRT explanation. Anyone who can twist the existing evidence to support SRT over MLET can twist any new experimental data in the same fashion.

### — Electromagnetism —

At least one other topic must be addressed before an ether theory can be considered complete. Specifically, a compatible explanation for electromagnetic effects is needed.

I have dealt with electromagnetism at some length in Chapters 3 and 5 of my book, *Escape from Einstein*. The fundamental results will be presented here without attempting to derive them. But please note that in the book I held to the belief that the speed of light was with respect to the gravitational potential. This position was similar to that which Beckmann[28] espoused. To his credit, the late Charles M. Hill would not let me hold this position without a precise mechanism to explain aberration of starlight. He forced me to revise my position on the speed of light; and, as a result, the only compatible viewpoint was to retreat to the Lorentz explanation of the Michelson-Morley experiment. This actually complements the other developments in the book and improves the theory rather than detracting from it. Thus, most of the content of Chapter 3, on the unification of electromagnetism with gravitational theory, is still valid. In addition, I believe that the proper force equation for electromagnetism (and for gravitation) as developed in Chapter 5 is still valid.

The gravitational force was considered above and it was determined that gravity did not act upon the kinetic energy. While the structural (gravitational) energy corresponds to the energy of ether compression, I believe that the kinetic energy corresponds to the ether shear energy. GRT also teaches that there is what is called a gravitomagnetic force. It is called gravitomagnetic because it is held that, as the electric force is to the magnetic force, so the gravitational force is to the gravitomagnetic. I believe this relationship is accurate, but I prefer to call the corresponding force the kinetic force rather than the gravitomagnetic. The analogy works very well. Just as an electric field exerts no force on a magnet, so the gravitational field exerts no force on the kinetic portion of a particle's energy.

But the analogy and the similarity of the equations hold even more significance. As argued in the book, I believe that the electric potential is nothing more than an oscillating ether compression or, in other words, an oscillating gravitational potential. Similarly, the magnetic potential is due to an oscillating shear or, in other words, an oscillating kinetic potential. In a recent paper[29] I show that the gravitational and kinetic forces together cause a moon or planet, which is orbiting around a gravitational source that is itself moving with respect to the absolute ether, to appear in the frame of the source as a gravitational force only. Again the result is very similar to electromagnetism.

The theoretical development above gives a new and simple explanation for gravitational effects. In turn, the gravitational developments provided a new and simple link to electromagnetic effects and thus a new understanding of them as well. While gravitational compressive effects obviously have only one sign, an oscillating compressive effect (electric potential) can have one sign for a compressive wave moving outward and another for a compressive wave moving inward. Magnetism also will have two polarities depending upon the phase direction of the shear strain in the ether.

Another interesting development from the link between electromagnetic and gravitokinetic effects is the realization that the gravity waves predicted in Einstein's GRT equations become nothing more than electromagnetic waves in the MLET development. There have been some interesting arguments about how much gravitational energy the Taylor-Hulse binary should radiate. If gravitational energy itself causes gravity as the GRT claims, one would expect the gravity wave equation to be non-linear. But it is not. The equation which seems to fit the observed amount is proportional

New Energy Times Archive

to the square of the kinetic energy. When the actual kinetic energy is doubled to fit the gravitational equations developed above, the energy so radiated agrees precisely with what the Equation for electromagnetic radiation would predict. But, if gravity waves are really electromagnetic waves, it is highly unlikely that the Laser Interferometer Gravity-wave Observatories (LIGO) will observe any gravity waves, since electromagnetic radiation is easily absorbed.

My brother Ed has written a book[30] about the predictions of MLET regarding the LIGO experiments. The book is a fictionalized account of a believer in MLET arguing with a believer in Einstein's relativity theories. The argument is very philosophical (no equations) and lots of fun.

## — Conclusions —

There are still aspects of the MLET theory which need further development. But what has been developed presents a logical and physically satisfying alternative to Einstein's relativity theory. The new MLET theory replaces the mathematical magic of SRT and GRT with a real intuitive physical mechanism. The physical is put back into physics. Cause and effect are returned to the prominence they deserve.

Several experimental tests, which can support or falsify this new theory, have been proposed. Precise probes of the solar gravitational field are needed. In addition, the prediction of the new theory is that the LIGO observatories will never detect any gravitational waves. The observatories are approaching initial operating startup, so this prediction will be confirmed or contradicted within the next decade.

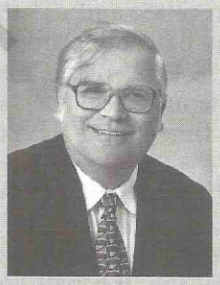
## — Acknowledgments —

This paper was originally prepared for a meeting of the Natural Philosophy Alliance meeting at the University of Connecticut, Storrs in Connecticut on June 10, 2000.

## References

1. Whittaker, E. 1951 and 1953. *A History of the Theories of Aether and Electricity Vol. I & 11*, Dover Reprint 1989, New York, preface.
2. Tyndall. 1966. Quoted in *The Relevance of Physics*, by Stanley Jaki, University of Chicago Press, p. 91.
3. Pauli, W. 1958. *Theory of Relativity*, Dover Reprint, New York.
4. Hatch, R. 1992. *Escape from Einstein*, Kneat Co., Wilmington, California, p. 44ff.
5. Shapiro I. *et al.* 1971. "Fourth Test of General Relativity: New Radar Result," *Physical Review Letters*, 26, 1132-1135.
6. Reasenberg, R. *et al.* 1979. "Viking Relativity Experiment: Verification of Signal Retardation by Solar Gravity," *Astrophysical Journal Letters*, 219-221.
7. Ciufiolani, I. and Wheeler, J. 1995. *Gravitation and Inertia*, Princeton University Press, p. 99.
8. Pound, R. and Rebka, G. 1960. "Apparent Weight of Photons," *Physical Review Letters*, 4, 337-341.
9. Pound, R. and Snyder, J. 1965. "Effect of Gravity on Gamma Radiation," *Physics Review B*, 140, 788-803.
10. Vessot R. and Levine, M. 1980. "A Test of the Equivalence Principle Using a Space-borne Clock," *General Relativity and Gravitation*, 10, 181-204.
11. Will, C. 1986. *Was Einstein Right?*, Basic Books, pp. 49-50.
12. Hafele, J. and Keating, R. 1972. "Around the World Atomic Clocks: Observed Relativistic Time Gains," *Science*, 177, 168-170.
13. Brault, J. 1963. "Gravitational Red-Shift of a Solar Line," *Bulletin of the American Physics Society*, 8, 28.
14. Hatch, R. 1999. "Gravitation: Revising Both Einstein and Newton," *Galilean Electrodynamics*, 10, 4, 69-75.
15. Montanus, H. 1997. "Arguments Against the General Theory of Relativity and For a Flat Alternative," *Physics Essays*, 10, 4, 666-679.
16. Van Flandern, T. 1993. *Dark Matter, Missing Planets and New Comets*, North Atlantic Books, Berkeley, p. 85 footnote.
17. Jerreries, C. 1992. "A Mechanism of Galactic Rotation," *Physics Essays*, 5, 2, 237-244.
18. Arp, H. 1998. "Intrinsic Red Shift in Stars," Chapter 4 in *Seeing Red: Cosmology and Academic Science*, Aperion, Quebec, pp. 95-113.
19. Mansouri, R. and Sexl, R. 1977. "A Test Theory of Special Relativity: I. Simultaneity and Clock Synchronization," *General Relativity and Gravitation*, 8, 7, 497-513.
20. Ives, H. and Stillwell, G. 1938. "An Experimental Study of the Rate of a Moving Clock," *Journal of the Optical Society of America*, 28, 215-226.
21. Marmet, P. 1999. " The Physical Reality of Length Contraction," Chapter 1 in *Einstein's Theory of Relativity Versus Classical Mechanics*, Newton Physics Books, Gloucester, Canada.
22. Hatch, R. 1999. "Symmetry or Simultaneity," *Galilean Electrodynamics*, 10, 3, 51-55.
23. Muller, R. 1992. "Thomas Precession: Where is the Torque?" *American Journal of Physics*, 60, 313-317.
24. Post, E. 1967. "Sagnac Effect," *Reviews of Modern Physics*, 19, 2, 475-493.
25. Ives, H. 1938. "Light Signals Sent Around a Closed Path," *Journal of the Optical Society of America*, 28, 296-299.
26. Ashby, N. 1993. "Relativity and GPS," *GPS World*, 5, 11, 42-48.
27. Moyer, T. 1971. *JPL Technical Report 32-1527*.
28. Beckmann, P. 1987. *Einstein Plus Two*, Golem Press, Boulder, Colorado.
29. Hatch, R. 1999. "Lorentzian Dynamics," Presented at the AAAS Swarm Division, April 13, Santa Fe, New Mexico.
30. Hatch, E. 1999. *LIGO: Prelude to Revolution* International Online Library (1stbooks.com), Bloomington, Indiana.

### About the Author



Ron Hatch is the Director of Navigation Systems at NavCom Technology, a GPS and satellite communications company which he and three other consultants started in 1995. He has worked with navigation and communications using satellites since 1962, when, while still in college, he worked at the U.S. Science Exhibit at the Seattle World's Fair demonstrating the Doppler effect on the signals received from the Navy's TRANSIT satellite system. Following college he worked for three years at Johns Hopkins University Applied Physics Lab developing algorithms for navigation and surveying using the TRANSIT system. For the next five years at Boeing and twenty-three years at Magnavox, Ron was noted for his innovative algorithm design applied to navigation and surveying via satellites, first with TRANSIT and then with GPS satellites. He has been a consultant on GPS for a number of companies and government agencies and has more than a dozen patents relating to high precision navigation via GPS.

Ron has served in several elected positions at the Institute of Navigation (ION) and is currently serving a one-year term as the President of the ION. In 1994, he received the highest honor of the ION's Satellite Division, the Johannes Kepler Award for "Sustained and significant contributions to satellite navigation"—the fourth recipient of this prestigious award. In 2000 he was elected a fellow of the ION and in 2001 he received the ION's Thurlow award for "outstanding contributions to the science of navigation."

Ron has been a long-time critic of Einstein's relativity theory and has written a book, *Escape from Einstein*, in which he began to develop an alternative theory. He has continued developing that alternative in a number of papers presented at Natural Philosophy Alliance meetings together with papers published in *Galilean Electrodynamics*.

*1142 Lakme Avenue, Wilmington, CA 90744
Email: ron@hatch.net

New Energy Times Archive

# Sagnac Effect Contradicts Special Relativity

A.G. Kelly*

### Sagnac Effect

Sagnac (1914) showed that light took different times to traverse a spinning disc with and against the direction of spin.

A light source S (Figure 1) emits light to a beam splitter C. Some of the light traverses the path SCDEFC and is reflected to a photographic plate O; some goes the other way SCFEDCO. The apparatus can rotate with an angular velocity ω. A light source, an interferometer at C, and a photographic plate at O are fixed to the disc. When the disc rotates, there is a fringe shift at the interferometer, proving that the two signals take different times to circumnavigate the disc.

Sagnac derived the difference in time, d$t$, as:

$$dt = 4A\omega/c^2 \qquad (1)$$

where A is the area enclosed by the light path, ω the angular velocity, and c the speed of light. The derivation of this formula for a circular path is as follows (Post): distances are exaggerated and light paths separated for clarity. With the disc stationary, the light takes a time $t_0 = 2\pi r/c$ for one circuit (Figure 2). The light source and interferometer are at S. When rotating, the anticlockwise signal will return to the interferometer at S′; the clockwise signal will return at S.″ Let ds′ be the distance SS′ and ds″ the distance SS″. Let $t'$ be the time for the light to go from S to S′ in the anticlockwise direction; $t' = [2\pi r - ds']/c$. Also $t' = ds'/v$, where $v$ is the velocity of the interferometer, so that $t' = (2\pi r)/(c+v)$. Similarly, $t''$ is the time for the light to reach S″ in the clockwise direction, $t'' = 2\pi r/[c-v]$. Then $dt = t'' - t' = (4\pi r v)/(c^2 - v^2)$. The $v^2$ term is neglected, giving $4A\omega/c^2$, as (1).

That time difference is calculated from the viewpoint of an observer stationary in the laboratory. But, it equals precisely the actual fringe shift detected at the interferometer upon the spinning disc. How can this be? There is only one possibility; the time measured aboard the spinning disc and measured in the laboratory are identical. If the light traveled at a speed of c relative to the disc, no fringe shift would occur. The test records that the light has completed one revolution of the disc at speeds of $c \pm v$ in opposing directions. The light speed relative to the laboratory is c. Other than reflection off mirrors on the disc, the rotation of the disc had no effect on the light.

Sagnac showed that the formula applied to any configuration or position of the axis of rotation. For a fringe shift of one fringe, using a disc of 1m radius; the velocity is about 13 m/s.

Harress (1911) did a test on the refraction of light, later shown to have produced the Sagnac effect. Michelson had theoretically derived the Sagnac formula in 1904. Anderson *et al.* say that Sir O. Lodge derived the formula even earlier.

Michelson and Morley in 1886 (M&M) proved that light travels at the same speed when sent in the direction of travel of the Earth on its orbit around the Sun, as when sent at right angles to that direction. In 1964, Jaseja *et al.* confirmed this to an accuracy of 1:1000.

In 1925 Michelson and Gale (M&G) conducted a Sagnac experiment, where the disc was the cross section of the Earth, and the speed of rotation its daily spin. They used a static rectilinear piping system, and recorded the difference in time taken by light to go in opposing directions. They applied the Sine of the latitude to the result, because the projection, on to the Earth's cross section, gives the area that rotates daily.

The accuracy of Sagnac's test was 1:100. Macek and Davis, using lasers, achieved an accuracy of 1 in $10^{12}$. Bilger *et al.* used a fixed ring-laser and achieved 1 in $10^{20}$.

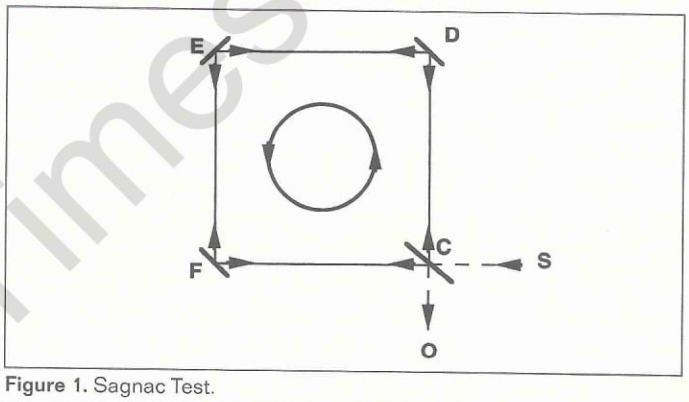



**Figure 1.** Sagnac Test.

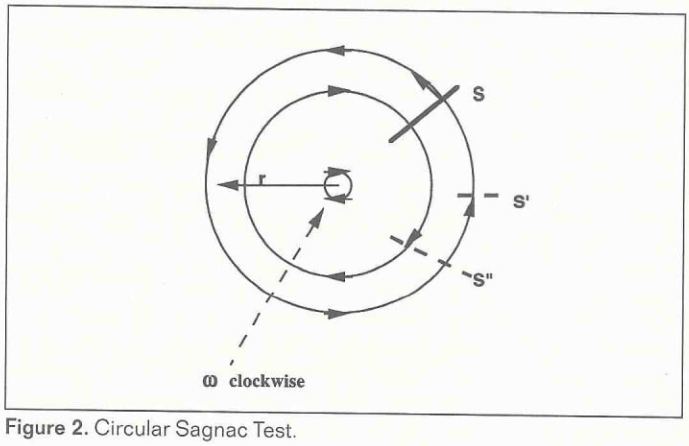



**Figure 2.** Circular Sagnac Test.

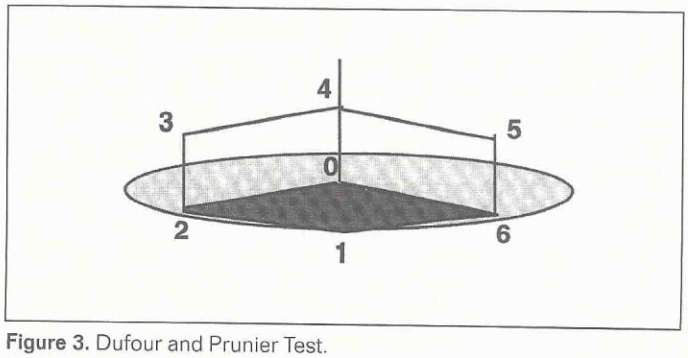



**Figure 3.** Dufour and Prunier Test.

New Energy Times Archive

**Einstein did not address the contradiction to his theory in the M&G test even though he visited the team working on this problem in 1921. According to Turner (1979), Einstein never referred to the Sagnac test.**

Dufour and Prunier (D&P) (1942) repeated the Sagnac test (Figure 3) on the path 1-6-0-2-1 and the reverse. They then did a test with the beginning and end of the light path on the spinning disc, but the middle portion reflected off mirrors fixed in the laboratory (directly above the disc); the path was 1-6-5-4-3-2-1 and the reverse. The fringe shifts were the same as in their first test. This confirms that the light is traveling at constant speed relative to the laboratory, and not relative to the disc. They showed that the photographic record of the fringe shift and/or the light source may be on or off the disc, without affecting the result; this is because it is the behavior of the light relative to the rotating disc that is being measured. There is a slight Doppler effect when the photographic equipment is in the fixed laboratory, because the disc is moving past the viewing lens. Post (1967) correctly dismisses the effect as $v/c$ smaller than the Sagnac effect, and too small to be observed.

Figure 3 had the path consisting of two straight lines 2-1 and 1-6, with two radial connections 6-0 and 0-2. A triangular path such as 1-2-0-1 would give the Sagnac result corresponding to the area of the triangle. The only part of the circuit contributing to the fringe shift is the straight line 1-2; the radial portions do not contribute. On a very large disc, using a small chord we approach a straight line Sagnac test.

Light sent in opposing directions aboard an object traveling in a straight line at uniform speed would never meet to be compared. There is nothing magical about the rotating disc; it just brings the signals back to be examined. Werner *et al.* (1979), using a parallelogram with a long axis of 8 cm, detected the Earth's rotation and showed that neutrons behave like light in a Sagnac-type test. Hasselbach and Nicklaus (1993) showed that electrons in a Sagnac-type apparatus behaved like light. They give over twenty competing generic explanations of Sagnac. They say *"the classical kinematical derivation has the advantage of yielding the correct first-order result in a very simple and intuitive way. Its starting point is a consideration that applies to any type of waves."*

### Sagnac Effect Versus Special Relativity

The Sagnac effect, and the effect calculated by the Theory of Special Relativity (SR) are of different orders of magnitude. SR stipulates that the time of the traveler ($t'$), is slower than that of the stationary observer ($t_0$).

$$t_0 = t'\gamma \qquad (2)$$

where $t_0$ is the time for the light to travel a certain distance, as measured in the stationary laboratory, $t'$ is the time for the light to complete the same distance as measured aboard the object, traveling at uniform relative speed and $\gamma = (1 - v^2/c^2)^{-0.5}$. Using Binomial expansion:

$$t_0 - t' = t'(v^2/2c^2) \text{ and}$$

$$\frac{t_0 - t'}{t_0} = \frac{v^2}{v^2 + 2c^2} \qquad (3)$$

$= dt_R$ the Relativity time ratio.

In the Sagnac case $t_0$ is the time for a light signal to traverse a stationary circular disc, and $t'$ is the time to traverse the spinning disc against the direction of spin, according to the observer on the disc.

$$t_0 = (2\pi r/c) \text{ and } t' = 2\pi r/(c+v)$$

$$\frac{t_0 - t'}{t_0} = \frac{v}{c + v} \qquad (4)$$

$= dt_S$ the Sagnac ratio.

The ratio of $dt_S$ to $dt_R$ is :-

$$\frac{v^2 + 2c^2}{v\,[c + v]} \qquad (5)$$

which for small values of v is $2c/v$.

The Sagnac effect is far larger than the effect forecast by SR. In the Pogany (1926) Sagnac test, where $v$ was about 20 m/s, this ratio is 30,000,000. Post agrees that the dilation factor of SR is $v/c$ smaller than the Sagnac effect.

Einstein did not address the contradiction to his theory in the M&G test even though he visited the team working on this problem in 1921. According to Turner (1979), Einstein never referred to the Sagnac test.

On a disc of huge radius a short light path approaches a straight line. It follows that an observer aboard an object which is traveling in a straight line at constant speed $\pm v$, relative to the laboratory would, if it could be measured, record the speed of light, relative to oneself, as c - or + $v$. That observer would record "time" as the very same as observers in the laboratory.

*It is not "time" that changes, as claimed by the Theory of Special Relativity, but the speed of the light that changes, relative to the observer aboard the object moving at uniform relative speed.*

Langevin (1937) attempted to prove that the Dufour and Prunier (1942) tests were compatible with relativity theory; this was successfully refuted by D&P. Langevin also said that the assumption of $c \pm v$ for the speed of light *"gave by a very simple and general reasoning the Sagnac result."*

Some authors, *e.g.* Post, say that the Sagnac effect can exist as well as the SR effect. This cannot be so, because the Sagnac effect proves that light does not travel at the same speed relative to observers in uniform relative motion. The Sagnac effect is in direct contradiction of SR.

### Sagnac Effect and Clock Synchronization

The effect of gravitation on time keeping of clocks is outside the scope of this paper. It is solely the effect of velocity that is being considered.

Atomic clocks run slow in relation to their "absolute" speeds with respect to the center of the Earth. This was dis-

New Energy Times Archive

covered when clocks were launched on satellites. A clock on a satellite runs slower than a clock on the surface of the Earth. An observer of this result at the Earth-fixed clock, or the satellite clock, will get the same result. Atomic clocks run slow in that fashion, and the readings upon the two clocks can be observed from any Inertial or non-Inertial Frame of reference.

Cocke (1966) showed that the shape of the Earth is such that a clock at any latitude will record almost the same time, due to the compensating effects of gravitational and velocity effects; this was not known in 1905.

A practical use of the Sagnac effect is the synchronization of clock-stations on the Earth, by interchange of electromagnetic signals. Transportation of a clock between sites is rarely used.

When electromagnetic signals are sent from one station to another, allowance has to be made for the fact that they travel at speeds of $c \pm v$ Westward and Eastward respectively.

The International Telecommunication Union (ITU) and the CCDS both set rules for synchronizing clock-stations. They have different definitions of *"coordinate time."* Before 1997 both (and still the latter) defined the *"coordinate time scale"* at the center of the Earth and the *"second"* as measured upon the rotating Earth; these are incompatible because the *"second"* upon the Earth runs slow by 37,700 ns/year, with respect to the Earth's center, and thus to the time scale as defined. The ITU retain the same formulae as the CCDS for corrections to the coordinate time, even though they now define coordinate time as *"on the rotating geoid."*

Both bodies name three corrections as *"relativistic"*; these are the velocity effect correction calculated under SR (for use when transporting a clock), the correction for the difference in gravitational potential under the General Theory (outside the scope of this paper), and a third correction named as *"for the rotation of the Earth."* This latter correction is the Sagnac correction; it has nothing whatever to do with relativity. It is the correction necessary because light does not travel around the globe Eastward and Westward in equal times. Invoking SR (still more General Theory) to explain the Sagnac effect is like claiming that the bouncing of a child's ball requires relativity theory to explain it. It is a simple first order effect. Indeed, the President of the CCDS wrote to this author in 1997 agreeing that the Sagnac effect *"is not relativistic."*

Having given examples viewed from geocentric frames, both bodies then say that the choice of a coordinate frame is *"purely discretionary"* and recommend the use of a frame fixed to the surface of the rotating Earth; after all, that is where we dwell. They then apply SR in deriving the time measured from that rotating frame. They use the ground speed $v$ of any clock being moved from one site to another to calculate the slowing. This result is not in accord with the slowing encountered in practice, which is proportional to the ground speed plus the tangential speed of the Earth at that place, as described above.

Saburi *et al.* (1976) sent an atomic clock by air from the U.S. to Japan. They also sent a signal via a satellite. The Sagnac correction, applied to the signal, concurred with the time shown on the transported clock. No Sagnac correction was needed to the time displayed upon the transported clock. The tiny aeroplane velocity effect was unimportant. The ITU add a Sagnac correction to *"the time accumulated in the reference frame traveling with the clock"* even though they define "time" as *"on the rotating geoid."*

The CCDS say (1997) that they now base their rules upon the tests by Wheeler *et al.* rather than those of Hafele and Keating used earlier, which are discounted in Kelly (1996). The Wheeler tests transported atomic clocks over and back Westward and Eastward across the U.S. They used the ground speed of the clocks being transported, which does not accord with the slowing found to occur in practice.

By utilizing a two-way signaling system, the only significant correction, when sending electromagnetic signals from one clock-station to another via a satellite, is a correction because the signal travels at $c \pm v$ Westward and Eastward.

The ITU (1997) uses two definitions of standard time, which differ by a set number of seconds, even though they had stated in 1982 that they would thence exclusively use but one. The CCDS has an incorrect value for the angular rotation of the Earth, although this is not carried into the calculation.

### Defenses of Special Relativity

The following are common defenses of SR, with a refutation of each.

1. Calculation, involving rotation of the Earth, is referred to a convenient Inertial Reference Frame situated at the non-rotating center of the Earth. Using that, it is claimed that light signals, which are sent around the Earth, Eastward and Westward (and thus causing a Sagnac effect upon their return), travel different distances; this is said to explain the Sagnac effect. This is ruse to explain the fact, as described earlier, that atomic clocks run slow with respect to that spot.

2. The Sagnac effect is peculiar to electromagnetic signals. The behavior of sound reflected around on a rotating disc is the same as light. Sound in still air is not affected by motion of the source. Substitute 'n' as the speed of sound (for c) at Figure 2, and we arrive at a Sagnac formula. It is the behavior of the sound, as determined by the "observer" upon the spinning disc, that is being measured. Do we say that sound is traveling different distances, as recorded in the nearby Inertial Frame, and that its speed is a constant to all observers in uniform relative motion? Because the Sagnac effect is the same for sound and light, the reason for the phenomenon must be the same. We know that the speed of sound varies with the speed of the observer with respect to the source. So it is with light.

3. The speed of the signal as measured in a Sagnac test is merely an "average"; the "instantaneous" speed is c at all points on the circuit. A circular Sagnac test using optical fibers was done, where the speed of the signal, by symmetry, must be $c \pm v$ at all points on the circuit against and with the spin respectively.

4. The shift of the fringes is not a direct measure of the speed of the signal. Indeed, but what else can cause the shift?

5. No matter how large the disc, it does not approximate to a straight line, because there is still some rotation involved. The center of the Earth (spinning around the Sun) is a suitable Inertial Frame.

There is no perfect Inertial Frame; each one chosen is an approximation of the ideal. It depends upon the amount by which the reference frame alters from the ideal, during a particular test. The Hafele and Keating test invoked a similar Frame of Reference as in case (1) above. During the forty hours flying time, which elapsed while sending the atomic clocks around the globe, the Earth turned by 1.6 degrees on its orbit around the Sun.

New Energy Times Archive

The center of the Earth turns $1.5 \times 10^{-6}$ orbital degrees during a test involving the sending of an electromagnetic signal around the Equator. Sagnac's 1914 test used an enclosed path of $0.086m^2$. His was a polygonal path; taking an equivalent circular path of radius 0.165m, the "observer's" position upon the disc would turn through an angle of $2.5 \times 10^{-6}$ degrees (speed of rotation 2/s) during the $3.5 \times 10^{-9}$s taken for the light signal to complete a circuit. This is certainly as good a so-called "Inertial Frame" as the geocenter, in the above cases.

During the M&G test, the reference frame of observation turned through an angle of $1.8 \times 10^{-7}$ degrees.

While the light signal went around the Bilger apparatus, the Earth turned on its axis by $4.8 \times 10^{-11}$ degrees. Bilger *et al.* used a square of side 0.866m upon a disc of 8,750,000m diameter (the cross section of the Earth at that latitude).

The center of the Earth is acceptable as a satisfactory Inertial Frame. But the surface of the Earth is not considered as an Inertial Frame for the Bilger test, even though there is no relative motion between observer and apparatus, and the center of the Earth rotates, in the first example above, by an angle greater by 3,000,000,000,000 than in the Bilger test. Some advocate the use of an Inertial Frame in the laboratory in the Sagnac test, or at the geocenter in the Bilger test. That would not improve measurable accuracy. There is little point in reducing the angle turned from $10^{-11}$ to $10^{-14}$ degrees! Adherents of SR would like to refer measurements upon the Earth to the geocenter, because atomic clocks run slow in relation to that place, as described earlier.

6. We can make the speed of light measure just about anything in a rotating frame of reference. An example is given of light traveling between far away galaxies, measured from the rotating Earth.

But, we are not doing anything so exotic; we measure the times for the light to travel distances that are here in the laboratory and are extremely short, as in the Bilger *et al.* test.

In the case of the Sagnac effect on the rotating Earth, it is claimed that the answer of $c \pm v$ is further evidence that the speed of light can be any value. Is it not astonishing that the assumption of $c \pm v$, for the speed of light travelling Westward and Eastward respectively, gives the precise measured result. It is not "any value"; it is the correct result.

These defenses have an air of desperation.

### Paradoxes Dispelled

Several SR paradoxes are dispelled, because "time" and "distance" are shown to be equal in the laboratory, and aboard objects moving at uniform relative speed. One is the perennial "twin" paradox, which predicts that one twin, who travels away from Earth at very high speed, returns younger than the other. Einstein was frequently challenged as to whether it was not the "relative" motion that mattered and thus would not either twin think the other was younger. Eventually, in 1918 he published a supposed explanation. He claimed that, during the reversal phase necessary to turn around and get back to Earth, the moving twin incurs a speeding of "time" that equals *exactly twice* whatever slowing occurs during the steady state, out and back, phase of the travel. This is a ridiculous statement. If the reversal took 1 second and the steady states 100 years, how could the "speeding" during reversal equal exactly twice the slowing? Alternatively, how could a reversal of selected fixed accelerations always cancel the slowing from steady periods of varying duration. He did not give any calculation, but just said that "calculation shows" it! This was a vain attempt by Einstein to salvage SR. This publication is never quoted by adherents of SR.

**Einstein (1905) stated "the unsuccessful attempts to discover any motion of the Earth relatively to the 'light medium'" suggested the idea that there was no such thing as "absolute rest." Now that the basic reason is removed, SR is no longer essential.**

A varying value of $\pi$ for rotating concentric circles of different radii does not occur (Ehrenfest, 1909); a fast moving long ladder cannot fit into a short stationary garage (Rindler, 1982).

### Behavior of Light

An M&M-type test was done by Brillet and Hall (1979) to an accuracy 4000 times better than Jaseja *et al.* Their results, analyzed by Aspden (1981), show a diurnal variation that was, to 3%, the spin velocity effect of the Earth. Light does not adopt the spin velocity of the Earth.

SR has two requirements for light; the speed of light is measured as a constant by observers traveling at uniform relative speed, and the speed of light is independent of the speed of its source. Neither of these requirements is, in all circumstances, compatible with the test results discussed.

Light has to satisfy the following conditions:

— The speed of light as measured on Earth does not show any effect caused by the orbital motion of the Earth around the Sun, to the accuracy of 1:1000.
— Light generated on Earth does not spin with the spin of the Earth upon its axis.
— Light generated in the laboratory is not affected by the motion of the object upon which it is generated. This includes a spinning disc, or an object moving at uniform speed in a straight line.

The following satisfies all of the above requirements: *Light, generated on the Earth, travels with the Earth on its orbit around the Sun, but does not adopt the daily spin of the Earth on its axis.*

In the case of light emitted on the Earth, the light speed is not independent of one component of the speed of the source (the movement of the Earth, on its orbit around the Sun). O'Rahilly (1938) first mentioned this as a possibility.

Einstein (1905) stated *"the unsuccessful attempts to discover any motion of the earth relatively to the "light medium"* suggested the idea that there was no such thing as *"absolute rest."* Now that the basic reason is removed, SR is no longer essential.

The tests by Sagnac and M&G were carried out on the presumption that there was an "ether"; this paper provides an alternative explanation.

New Energy Times Archive

Gravitational attraction must move around with the Earth, on its orbit around the Sun. Light emitted upon the Earth adapts to the motion of the Earth when within the influence of its gravitational field. The behavior of light in outer space is not as Einstein proposed. It travels at speeds of $c \pm v$ where $v$ is the straight-line speed of the observer relative to the spot in space where the light was emitted.

### $E=mc^2$

In 1903 De Pretto derived the precise formula $E=mc^2$; his family was known to Einstein via Besso, who is mentioned in Einstein's 1905 paper as having helped (Monti). This equivalence is in conformity with the proposals in this paper.

### Conclusions

The Sagnac effect is in direct contradiction of SR. It is a non-relativistic first order effect. Time and space are absolute, not relative. The speed of light is not a constant to observers in uniform relative motion. Light travels around the Earth at speeds of $c \pm v$ Westward and Eastward respectively. Light, generated upon the Earth, travels with the Earth on its orbit around the Sun; it is independent of the daily spin of the Earth. The international rules for clock synchronization are contradictory.

The speed of light has an absolute limit of c, and a relative limit of 2c.

### References


**Anderson, R.** *et al.* 1994. *Am. J. Phys.*, 62, 11, 975-985.
**Aspden, H.** 1981. *Phys. Lett.*, 85A, 8.9, 411-414.
**Bilger, H.R., Stedman, G.E., Screiber, W., and Schneider, M.** 1995. *IEEE Trans.*, 44 IM, 2, 468-470.
**Brillet, A. and Hall, J.L.** 1979. *Phys. Rev. Lett.*, 42, 9, 549-552.
**CCDS.** 1980. 9th Session Comité Int. Poids Mesur. S 15-17 (renamed CCTF 1997).
**CCDS.** Private Correspondence. March 1997.
**CCIR Report** 439-5 1990 *Int. Telecom.Union* 17th Session 150-4; see ITU.
**Cocke, W.** 1966. *J. Phys. Rev.*, 16, 662-664.
**De Pretto, O.** 1903-1904. *Proc. Veneto Roy. Inst. Sci. Lett. Arts. A.A.*, 63, Pt 2, 440-500.
**Dufour, A. and Prunier, F.** 1942. *J. Phys. Radium*, 8th Ser., 3, 9, 153-161.
**Ehrenfest, P.** 1909. *Phys. Zeit.*, No. 23, 918.
**Einstein, A.** 1905. Paper in 1923, *The Principle of Relativity* (London: Methuen).
**Einstein, A.** 1922. *The Meaning of Relativity* (London: Methuen).
**Einstein, A.** 1918. *Naturwiss.*, 48, 699-702.
**Hafele, J.C. and Keating, R.E.** 1972. *Science*, 177, 166-170.
**Harress, F.** 1911. Jena University (unpublished thesis).
**Hasselbach, F. and Nicklaus, M.** 1993. *Phys. Rev. A*, 48, 1, 143-151.
**International Telecommunications Union** Report TF1010-1 1997; see CCIR.
**Jaseja, T.S., Javan, A., Murray, J., and Townes, C.H.** 1964. *Phys. Rev.*, 133, 5A, A1221-1225.
**Kelly, A.G.** 1995-1996. *Inst. Engineers Irel. Monograph*, No 1 & 2 (free from 22 Clyde Rd, Dublin 4).
**Kelly, A.G.** 1996. *Monogr.* No 3, ditto.
**Langevin, P.** 1937. *C.R. Acad. Sci.*, 205, 304-306.
**Macek, W.M. and Davis, D.T.M.** 1963. *Appl. Phys. Lett.*, 2, 3, 67-687.
**Michelson, A. and Morley, E.W.** 1886. *Am. J. Phys.*, 31, 185, 377-386.
**Michelson, A. and Gale, H.G.** 1925. *Astroph. J.*, 61, 137-145.
**Monti, R.A.** 1996. *Phys Ess.*, 9, 2, 238-260.
**O'Rahilly, A.** 1938. *Electromagnetics* (Longmans Green, London).
**Pogany, B.** 1926. *Ann. Phys.*, 4, 11, Band 80, 217-231.
**Post, E.J.** 1967. *Rev. Mod. Phys.*, 10, 2, 475-493.
**Rindler, W.** 1982. *An Introduction to Special Relativity* (Oxford: Clarenden Press).
**Saburi, Y., Yamamoto, M., and Harada, K.** 1976. *IEEE Trans.*, IM25, No 4, 473-477.
**Turner, D.** 1979. *The Einstein Myth and the Ives Papers* (Devin-Adair).
**Werner** *et al.* 1979. *Phys. Rev. Lett.*, 42, 17, 1103-1106.


### About the Author


Al Kelly, Ph.D., an engineer, is Chairman of H.D.S. Energy, manufacturers of industrial boilers. He was, until 1991, Executive Director of Generation and Transmission of the national Electricity Utility of Ireland, and Chairman of their International Consultancy business. He was a founder and Chairman of Top Tech Ireland, a computer services firm. Dr. Kelly is author of *How to Make Your Life Easier at Work* (McGraw-Hill, New York), a light-hearted manual on management which was a bestseller in seven languages, in hardcover and paperback. He published many articles on engineering innovations, notably one proving that a siphon can lift water to a height greater than the equivalent of atmospheric pressure, which merited an entry in the *Guinness Book of Records*. Dr. Kelly is author of six monographs published since 1995 by the Institution of Engineers of Ireland, which challenge the Special Theory of Relativity and Faraday's Law. In the latter case he constructed equipment to prove that the "field" of a magnet rotates with the magnet upon its N-S axis, which was denied by Faraday and intervening experimenters. Dr. Kelly is a Fellow of both ASME and the I.Mech. E (UK).

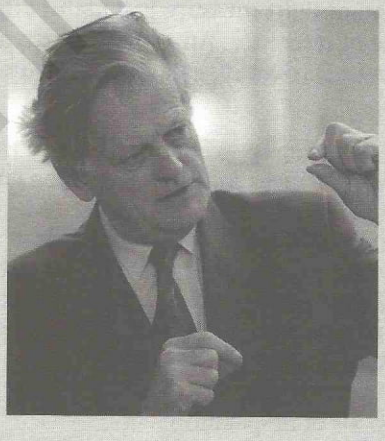
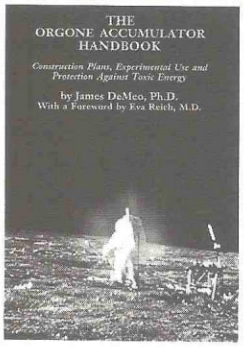


Photo courtesy of *The Irish Times*. Photographer: Frank Miller.

*HDS Energy, Celbridge, Co. Kildare, Ireland.
Email: agkelly@eircom.net



## The Orgone Accumulator Handbook




Paperback, 162 pp.

by Dr. James DeMeo

- Extremely useful introduction to orgone energy research.
- Construction techniques for making orgone accumulators.

$15.95 North America
$19.95 Foreign
• Prices Include Shipping •
Order from:
Cold Fusion Technology, P.O. Box 2816
Concord, NH 03302-2816




New Energy Times Archive

# Subjectivism, Scientism, and Special Relativity

John E. Chappell, Jr.*

One of the most impressive volumes to emerge from the discipline of the history of science in the twentieth century was a distinctive critical survey of science in the modern period (including many comparisons with ancient science) by Charles Gillispie: *The Edge of Objectivity*, published in 1960. It appeared only two years before the late Thomas Kuhn's very influential *The Structure of Scientific Revolutions*.[1]

Although both very well done and very valuable, the two books are very different in some important ways. Gillispie went along with the traditional view of scientific change as usually involving both real progress and a great degree of continuity between eras. Kuhn made his impact largely by questioning whether changes always involve progress, and by emphasizing the differences, rather than the similarities, between successive ways of doing and thinking about science—*i.e.*, between successive "paradigms," a word he elevated from an obscure term used in studying grammar to a virtual "household word" among scholars, in social as well as in natural sciences.

Kuhn's thought also did much to change the discipline of history of science in large measure into a sort of *sociology* of science, concentrating more on looking for cultural biases in the minds of scientists, than on mastering the difficult technical points in the sciences themselves. This change was often interpreted as offering an easy way out for historians of science short on technical background, who could now with full respectability act more like dabbling antiquarians, than like scientifically-trained scholars. But the important truths newly emphasized by Kuhn were generally considered more important than this loss of scientific rigor.

In 1964, Kuhn moved from the University of California at Berkeley to join Gillispie on the faculty of Princeton University. The two had been good friends for many years, and plans for the move had been laid before the enormous impact of Kuhn's 1962 book had been felt. At Princeton they interacted positively and harmoniously despite continuing to adhere to their significantly different viewpoints on how science develops. They worked together for fourteen years at Princeton, during which time Kuhn's book became the most-cited volume in all of academia. Then Kuhn spent a year at NYU, before moving permanently to MIT in 1979.

The only time I ever spoke to Gillispie in person, at a meeting in 1985, he very humbly characterized *The Edge of Objectivity* as rather old-fashioned.

But I thought then, and still do, that this self-evaluation was *too* humble. In fact, I believe Gillispie's book speaks very cogently to some of the most crucial needs of contemporary scholarship, by serving to clarify the difference between valid science and inadequate quasi-science—at least some of the latter having been stimulated by the tolerance for subjectivity that Kuhn's almost-relativism (he was not an out-and-out relativist, as many claim) helped to inspire.

Gillispie characterized the course of genuine scientific progress in modern times as one marked by the constant superseding of largely subjective ancient science (Aristotle's physics was a particularly vulnerable example) by the advancing front or "edge" of much more objective modern science. He helped to define what he meant by "objectivity" by considering also its opposite, as exemplified by the unfortunate attempts by the great German poet Goethe (late eighteenth and early nineteenth centuries) to challenge and replace Newton's theory of colors. Goethe, who of course worked and wrote mainly in the humanities, achieved moderate success with his work in biology; but then, more seriously hampered in physics than he was in biology by his highly subjective habits of mind, he stumbled into serious error by believing that light is "the manifestation of the immanent divine," and even involves emotions.[1]

Like almost every other non-physicist of the time, Gillispie interpreted modern physics in the way that physicists told him to. But one wonders how he might have doled out accusations of non-scientific subjectivity, if he knew what many hundreds of contemporary dissident physicists know about it. In any case, I wish to make such a judgment myself. The largely unrecognized crisis in modern physics stems very largely, probably primarily, from a failure to exert sufficient effort to move beyond comfortable subjectivity, into more difficult yet more rewarding effort out there on "*the edge of objectivity*."

For the physicist of today, it is not so much a matter of being mired in the humanistic or the poetic, as in the case of Goethe, as it is of just being too willing to stop searching, once an easy interpretation is found that seems congenial to the viewpoints and biases of the typical physicist. Now and then a physicist will say: "I didn't expect nature to be so wild and weird; but the empirical evidence indicates that it is." Of course, with help from the sort of "constructivist" exploration of the scientist's choices that has been in recent decades encouraged by Kuhn's thought (A "constructivist" critique of science argues that what a scientist offers as a true reflection of nature may instead represent primarily a social or cultural "construct."), one may often discern that the wildness and weirdness are mainly in the scientist's mind, rather than in nature; and that he simply gave up and stopped short of reaching a truly objective answer.

After all, as Kuhn made clear, in perhaps the most important idea in his entire corpus of work, in choosing their paradigms scientists often lean primarily on *nonscientific* motives and biases.

In my talks at meetings of the Natural Philosophy Alliance, I have managed to take this concept of leaning on non-scientific motives and turn it against modern physics—a procedure that Kuhn, as well-trained in and as highly trusting of all standard physics as he was, never even began to attempt. I have regularly characterized the chief bias of contemporary physics as being in favor of "the irrational and the bizarre"—roughly



New Energy Times Archive

another way of saying "the wild and the weird."

Perhaps an equally important bias has been the wish to seem unusually important, superior to ordinary people and their "common sense." Common sense is often spoken of with disdain by physicists, who want us all to believe, as Einsteinian special relativity (SR) teaches, that time and space are radically different from what earlier scientists and those who trust in common sense have thought they must be like.

The latter of these two biases is virtually by definition *subjectivist*, in nature; it elevates personal motives and feelings above whatever external nature might show to be true and important. It involves a flight from the difficult struggle to achieve real objectivity, in favor of easy satisfaction with the familiar and the self-serving. Let us believe in what elevates and preserves ourselves, the physicists are in effect saying, and then fashion it into a new paradigm that we offer to the world as a profound insight into the true nature of the universe.

Let us, *e.g.*, explain that only by way of our marvelous new theory can people realize that time does not run smoothly and evenly and everywhere the same, as has always been thought, but that it can actually change its rate of flow, and that simultaneity is not the same in every coordinate system; "the evidence" proves it. Maybe we can't sustain the old myth, commonly heard as late as the middle of the twentieth century, that only twelve people in the entire world—twelve of *us*, of course—can fully grasp these new insights; but still we can impress others that we and our mentors have been mental giants, who deserve more research funding than all other sciences put together. (In many years this has indeed been the case.)

Apart from this particular sort of claim to exclusiveness and superior insights is a claim that has often been made from beyond the borders of physics, throughout all of science and even beyond, for even longer than the past century: that *science in general* provides a superior avenue to truth on nearly every matter, and that unless one searches for truth in the way scientists search for it, the validity of one's answer is in serious doubt. This attitude implies that one should believe only in what one can sense and measure and quantify, what one can be "positive" about—as suggested by influential "positivists" around the beginning of the twentieth century, such as Mach, Ostwald, and Duhem. And positivism has tended to be close to materialism, since what science measures is primarily only material reality. This in turn leads to serious skepticism about all claims for the spiritual and for the immaterial.

Positivist and materialist views may provide a good foundation for science *per se*. But too often a scientist is heard to claim, for example, that he doesn't believe in God because he can't find any scientific evidence for God. Or in prayer, because it can't be pinned down and measured, like a laboratory procedure. Such applications of scientific methods and criteria beyond the realms in which they are appropriate are often termed *scientism*. Rightly so, the word "scientism" is usually applied in a pejorative sense. I suggest that scientism represents a form of subjectivism, of hyperinflation of what seems personally important, at the expense of the objective and the transcendental (*i.e.*, what exists beyond immediate sense evidence).

Scientists often make scientistic evaluations not only in realms of thought where they clearly have no business intruding, such as religion (How could science possibly enlighten us, *e.g.*, as to moral judgments of right and wrong?), but also in areas of secular scholarship beyond the range of what is now well-known, yet conceivably able to be brought later within that range. For example, at the 1979 Houston meeting of the American Association for the Advancement of Science (AAAS), one well-known physicist distributed a list of topics he branded as pseudoscience; and on it he included ESP—extra-sensory perception, or mental telepathy. But in fact no one has yet proven that there is not an actual sense in living organisms, a telepathic sense, that works and could be analyzed scientifically. The constant practice of prayer among religious people is one example of trying to generate telepathic responses; and if it had not been successful at least part of the time over the millennia of human existence, one strongly suspects that it would no longer be so heavily recommended. Many other examples of telepathy other than prayer have been so convincingly documented that it may be appropriate to claim they already have real scientific validity.[2]

At that 1979 AAAS meeting, I distributed several copies of an answer to this very scientistic physicist, arguing that no claim of ESP is quite so ridiculous as that attributed by contemporary physicists to *photons*—which are very tiny and of course do not even possess minds—when they affirm the second postulate of SR, which in effect says that any photon approaching an observer senses when the observer moves toward or away from the photon, and then adjusts its own velocity so that it always remains at a constant *c* relative to the observer.

The word "scientism" has also been frequently applied to attempted applications of the scientist's point of view in other fields. This was very common during the nineteenth century, especially among social scientists, who often tried to apply alleged "scientific" methods to analyze subject matter that does not at all easily yield to such treatment. This was done by Comte, who in the early nineteenth century called his new brand of social and historical analysis "positivism," unjustly claiming for it a degree of certainty and prestige comparable to that attained by Newtonian physics; and then after Comte, Marx and Engels developed theories that were also largely scientistic, rather than truly scientific as they wanted us to believe they were.

But what I wish to emphasize most heavily in this article is that scientism has wreaked havoc *within the realm of science itself*. For example, only scientistic arrogance could claim that physics alone is authorized to tell us what *time and space* are all about; after all, both dimensions suffuse the subject matter of every scholarly discipline, and even of everyday life itself: the *lebenswelt* ("lifeworld") that philosophers such as Husserl and Merleau-Ponty invoked in protesting the wild and weird new concepts of SR, especially in regard to time. Philosophers today almost universally ignore these protests against SR—just as physicists, straining to adhere to standard dogma, ignore Einstein's various papers (especially in the 1920s) arguing in favor of an aether. But there they are, clearly in print, and some day these philosophers are going to get credit for their very acute insights.[3]

The most damaging manifestation of scientism in physics lies in the disciplinewide contempt for philosophy. Of course, if all philosophers were doing merely speculative metaphysics, offering theories about the nature of the universe that are not backed up with solid empirical evidence, it would be easy to share their disdain. But philosophy also includes *logic*, a very fundamental branch of knowledge which is at least as rigorous as mathematics—so beloved of nearly all scientists—and in my opinion even more fundamental than mathematics: you can follow all the mathematical rules in



New Energy Times Archive

your reasoning, but if you change the definition of one symbol in the middle of your argument, you have violated the most fundamental rule of logic, the *law of non-contradiction*, and your argument then loses all claim to validity.[4]

Modern physics violates this law frequently. In the case of SR, Einstein violates it near the start of his famous 1905 paper on special relativity, when in his attempt to show, by means of his famous and often republished train-and-embankment thought experiment, that simultaneity varies with relative motion, he first attributes to the light beams on the train the variable velocities of $c \pm v$, and then later clearly implies that they each have the velocity of c, unmodified.[5]

Especially in his disagreements with quantum physics, Einstein stressed his belief that his own relativity theories embodied an objective approach to nature. But he simply did not fully understand what these theories represented in this regard.

It is true, however, that even more glaring examples of unjustified subjectivity can be found in Copenhagen-type quantum physics, and that these do much to support the view that disdain among physicists for philosophy and especially for logic has left them deeply mired in counter-productive subjectivism and scientism. It is way past time for them to display renewed respect for the criterion of objectivity.

(This article is adapted from a paper read at the Natural Philosophy Alliance meeting in Denton, Texas, in March 2001. Sincere thanks to Charles Gillispie for reading an early draft of this article and making important suggestions.)

**References**

1. Gillispie, Charles C. 1960. *The Edge of Objectivity*, Princeton, NJ: Princeton University Press; on Goethe, see pp. 192-199 (quotation is from p. 195). Kuhn, Thomas S. 1962. *The Structure of Scientific Revolutions*, Chicago, University of Chicago Press (revised 2nd ed., 1970; unrevised 3rd ed., 1996).

2. Among the most impressive evidence for the reality of telepathic processes, both among humans and between humans and their pet animals, has been that advanced by British biologist Rupert Sheldrake. See his book *Dogs That Know When Their Owners Are Coming Home*, New York, Crown Publishers, 1999; and his article "Research on the Feeling of Being Stared At," *Skeptical Inquirer*, March-April 2001, pp. 58-61. In July 2001, this writer heard Sheldrake lecture, and he was very convincing,

3. See for example Husserl, Edmund. 1970. *The Crisis of European Sciences and the Transcendental Phenomenology*, translated from German by David Carr, Evanston, IL, Northwestern University Press, (written 1934-1937); see esp. p. 295.

4. Although without reference to the rules of logic, the serious danger of making shifting assumptions is very capably argued in Munch, Neil E. 1999. "Conflicts in Special Relativity Resulting from Assumption Shifts," *Galilean Electrodynamics*, Vol. 10, Special Issue No. 2, Fall, pp. 32-35.

5. Einstein's argument for relative simultaneity was soundly refuted in Evans, Melbourne. 1962. "The Relativity of Simultaneity: A Critical Analysis," *Dialectica* (Switzerland), Vol. 16, pp. 61-82, 299-301. Evans, Prof. Emeritus of Philosophy at the University of New Mexico, passed away in May 2001 at the age of 89. The author will send an outline of his 1962 argument versus Einstein to anyone who writes and asks for one.

### About the Author

John E. Chappell, Jr. earned a Ph.D. in history (with emphasis on history of science) and geography. He has over eighty-five scholarly publications, and has served as Director of the Natural Philosophy Alliance since its founding in 1994.

*P.O. Box 14014, San Luis Obispo, CA 93406

McCausland continued from page 13

instead of a clock, and pretend that the clocks seen through the looking glass were real clocks.

It is obvious that the information provided to the observers in each case is just the same as if they read the adjacent moving clock directly without using the intermediary moving "clocks." Those clocks are both misleading and superfluous: misleading because they do not work as good clocks should, and superfluous because the observers can take the readings of the adjacent stationary clocks directly as they pass along the string.

If we consider more fully the case mentioned in (1) above, we can easily see that, if we have a pair of relatively stationary clocks that run faster than normal (for example, suppose they run at double the normal rate), it would be possible to synchronize those clocks by light signals as in the definition of synchronization. All that Einstein's argument has shown is that the settings for such mutual synchronization are different from the settings required for both clocks to match the readings of the adjacent stationary synchronized clocks as they pass along the row. This should be no surprise: if we allow some clocks to run faster than they should, and compare their readings with other clocks that run at the correct rate, we should expect to encounter some anomalies.

In conclusion, I suggest that Einstein's argument, that clocks that are synchronized for a stationary observer are not synchronized for a relatively-moving observer, is incompatible with the strict interpretation of his definition of synchronization and represents a serious problem for the special theory.

**References**

1. Einstein, A. 1923. "On the Electrodynamics of Moving Bodies," in *The Principle of Relativity*, by H.A. Lorentz, A. Einstein, H. Minkowski, and H. Weyl, London, Methuen, pp. 37-65.

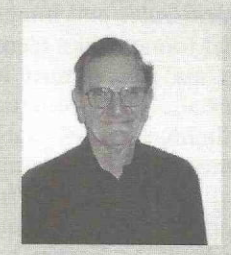
2. Dingle, H. 1972. *Science at the Crossroads*, Martin Brian & O'Keeffe, London.

3. Stadlen, G. 1972. "Dingle's Challenge," *The Listener*, 88, 411-412.

4. Hall, D.E. 1978. "Intuition, Time Dilation, and the Twin Paradox," *The Physics Teacher*, 16, 209-215.

5. McCausland, I. 1999. "On the Consistency or Inconsistency of Special Relativity," *Physics Essays*, 12, 438-445.

### About the Author



Ian McCausland was for many years a Professor in the Department of Electrical Engineering (now the Edward S. Rogers Sr. Department of Electrical and Computer Engineering) at the University of Toronto, and is now Professor Emeritus. He holds B.Sc. and M.Sc. degrees in electrical engineering from the Queen's University of Belfast, Ph.D. in electrical engineering from the University of Toronto, and Ph.D. in control engineering from the University of Cambridge. He has been involved in the critical study of relativity for about thirty years.

*Edward S. Rogers Sr. Department of Electrical and Computer Engineering, University of Toronto, Toronto, ON, Canada M5S 3G4; Email: ian.mccausland@utoronto.ca

New Energy Times Archive

# The Sagnac and Michelson-Gale-Pearson Experiments:

## THE TRIBULATIONS OF GENERAL RELATIVITY WITH RESPECT TO ROTATION

Paulo N. Correa and Alexandra N. Correa*

A cosmic universal frame of reference for the propagation of electromagnetic energy has been found, in direct contravention of Special Relativity—yet, as soon as it was made, this discovery was co-opted by Big Bang ideologists as evidence for a cosmic entropy. Relativist metaphysics succeeded in keeping its cake and eating it too. Such are the privileges of theories that become part of the organon of royal science.

**Abstract**

In the history and theory of Physics, there are accursed experiments voted to systematic oblivion. Two such examples are the 1913 Sagnac and the 1925 Michelson-Gale-Pearson (MGP) experiments, which, to this day, remain welded together as the repressed of General Relativity (GR).

That the MGP experiment was voted to oblivion is all the more glaring an omission, since it was supposed to provide a test for Einstein's "principle of equivalence" of inertial and gravitational masses, the actual basis for GR. The relativistic expectation sanctioned by Einstein in 1924 was that the MGP experiment should detect a full fringe shift in order to confirm General Relativity, whereas a null result would have been compatible with the notion of a partial aether drag. Note that the expectations regarding the null result had now been inverted with respect to the MM experiment, because the MGP experiment tested for rotation and not translation of the Earth. So argued Einstein.

In this context, the authors wonder why should *rotation be measurable* because of a Spacetime drag of inertial frames in rotation, and *translation remain unmeasurable* and unable to elicit the dragging of its own inertial frame, when translation is also a gravitational motion and there must be equivalence in principle between inertial and non-inertial frames? The problem is further highlighted by GR's later confrontation in the early 1930s with the 1913 Sagnac effect, because GR is here constrained to admit that, "for non-inertial frames," the speed of light is no longer constant. After all, to be consistent with itself, as Aspden has pointed out, Relativity should have followed Mach's lead and proposed that one should not be able to electromagnetically measure any speed of rotation with respect to Space. To achieve this somersault, Einstein adopted the relativistic dragging of inertial frames from aether drag theory, and even went as far as claiming in 1920 that with GR, "the conception of the ether has again acquired an intelligible content, although this content differs widely from that of the ether of the mechanical undulatory theory of light."

But did Einstein's trajectory remain loyal to this program? The authors contend that it did not. Central to the GR paradox was the *axiomatic assumption that gravitational field energy can be treated as reducible to the interval metric structure of Spacetime itself.* From an energeticist perspective, this was an essential metaphysical lapse—emptying gravitation of its energetic content and replacing it with the structure of a manifold that is susceptible to the criticism that it essentially confuses Time with Space. Moreover, there is no intrinsic or heuristic requirement on the part of the Sagnac effect for any time-dilation transformations. Einstein was, in fact, obliged to treat the continuum as a pseudo-Riemannian manifold that had a *separate physical reality distinct* from the spatiotemporal relations between material objects. This clearly introduced substantivalist considerations into what was originally deemed to be a relationist project.

These considerations lead one to become suspicious of Einstein's utterances about *an aether compatible with* Relativity. The problem is that the "aether" that Einstein increasingly appeared to have in mind, rather than becoming, as promised, a "non-material, non-mechanical, and gravitational aether," turned instead into a pure *metaphysical fiction;* a disembodied Spatial reality endowed solely with a mathematical existence and barred from any access to Time and synchronicity. *Einstein operated a reduction of gravitational theory to geometry, and ultimately precluded therefore any recourse to the notion of gravitational energy.* With this mystification, rotation was indeed made to appear as a mystery of nature.

Subsequent evolution of relativistic cosmology at the hands of Einstein's successors has resurrected the problem of absolute motion in the measurement of peculiar velocity with respect to the cosmic background radiation (CBR). A cosmic universal frame of reference for the propagation of electromagnetic energy has been found, in direct contravention of Special Relativity—yet, as soon as it was made, this discovery was co-opted by Big Bang ideologists as evidence for a cosmic entropy. Relativist metaphysics succeeded in keeping its cake and eating it too. Such are the privileges of theories that become part of the organon of royal science.

> *". . .Classical theory tends to start out with charge as the source of electric fields, whereas Relativity pulls field out from nowhere by the magic of abstract transformations of reference frames."*
>
> H. Aspden, *Modern Aether Science*, 1972, p. 85

© 2001 Correa & Correa—All rights reserved.



New Energy Times Archive

## 1. The MGP Experiment as a Test of General Relativity: Einstein's Ambivalence

There are some experiments in the history and theory of Physics which are systematically ignored. One such glaring omission is the 1913 Sagnac experiment, whose principle and effect are today used in the ring laser gyro applied to submarine and satellite navigation, and another significant omission is the Michelson-Gale-Pearson (MGP) experiment which was supposed to provide proper verification of Einstein's GR, in accordance with Silberstein's proposal.

The omission of the MGP experiment is all the more glaring as it was supposed to provide a test for Einstein's "principle of equivalence," the actual basis for GR, which posits the equality of inertial mass and gravitational mass. And this is precisely the excuse that textbooks on the matter utilize to ignore the MGP experiment: that it falls outside the scope of Special Relativity and can only be addressed by GR. In this vein, A.P. French's MIT course and textbook on SR did not even mention the MGP or the Sagnac experiments once.

This argument can certainly be seen as specious if we consider that, strictly speaking, the MGP experiment has never been cited as an experimental confirmation of GR—not even by Einstein when he enumerated, towards the end of his life, the three major tests of GR as being: the oval orbit of Mercury, the bending of light rays in a gravitational field (which he considered confirmed by the English Solar Eclipse Expedition), and the spectral redshift. However, around the GR theory, Einstein elaborated a series of considerations on gravity waves (1916) and the gravitational aether, which were not really part of GR but in fact straddled his attempts to develop a unified field theory. Be that as it may, the question that awakens one's attention is—why should Relativity (GR), when predicting the outcome of the MGP experiment, expect a positive fringe shift with regard to the rotation of the earth, whereas beforehand, as a Special Theory (SR), it had based its axiomatic assumptions upon the null result of the MM experiment with regard to translation of the Earth?

Back in 1924, the relativistic expectation, as proposed by Silberstein and sanctioned by Einstein, was indeed that the MGP experiment should detect a full fringe shift if it were to confirm Relativity, whereas a null result would have been compatible with the notion of a partial aether drag. The expectations regarding the null result had been inverted with respect to the MM experiment, because the MGP experiment tested for rotation and not translation of the Earth—so argued Relativity. The major difference between the MGP experiment and the MM experiment is that the MGP experiment *utilized a fixed interferometer rather than a rotating one,* measuring a four-way propagation of light around a very long rectangular pathway (the East-West legs were 612m long, and the North-South legs were 339m long). Since there was no rotation of the observer, the latter remained fixed to the revolving frame of the Earth.

The outcome of the MGP experiment was ambiguous, though maybe no more ambiguous than the small persistent positive shift observed in MM experiments. Composed of 269 separate tests with readings that varied from -0.04 to +0.55 of a fringe, and a mean at +0.26 fringes, the MGP experiment could be interpreted to yield a positive result of ≈ 0.3 km/s—therefore near the speed of the Earth's rotation—but the result was of borderline significance. It could be said that the experiment was inconclusive because it adduced neither proof that there was a shift in the phase of the light beams, nor that there wasn't one. With his typical inclination towards ambiguity, Michelson concluded that "the result may be explained on the hypothesis of an ether fixed in space, but may also be interpreted as one more confirmation of Einstein's theory of relativity."[1] This was a major ambivalence on Michelson's part, and one which might appear to justify Einstein's reservations about Michelson's *own* understanding of the problems at stake, were it not for the fact that Einstein himself was subject to a comparable *ambivalent oscillation*. Indeed, why should GR predict that rotation was optically measurable but not translation?

This question is all the more poignant as Ernst Mach, whose work was considered by Einstein himself to be the forerunner of Relativity, had suggested precisely this postulate on the basis of what he saw to be the impossibility of distinguishing whether the Earth rotated or was immobile and the stars alone circled the Earth. This *undiscernability and equivalence* was the basis for postulating the relativity of all motion with respect to the motion of other *material* bodies, and was the cardinal assumption which Einstein elaborated into the first guiding principle of SR. When Mach had enunciated this principle with respect to rotation, it did not yet constitute a complete break with classical thought, exactly because rotation was considered to form a "bad and forbidden system of coordinates" (to employ Einstein's and Infeld's expression in their criticism of classical kinematics), an anomalous non-inertial frame. Einstein, however, applied Mach's principle to translation, where the frame is directly considered to be inertial. Why then, when Einstein returned to the problematics of gravitation and rotation, should he choose to invert Mach's original proposition by suggesting that, whereas with SR the absence of fringe shift in the MM experiment was explained by Mach's principle, GR should predict the presence of fringe shifts for the MGP experiment, in apparent contradiction with Mach's principle?

To many authors, herein lies a clear indication of the *fundamental ambivalence* of Relativity regarding the physics of a "non-inertial" rotating frame. After all, to be consistent with itself, as Aspden correctly pointed out in his "Physics Unified," Relativity should have followed Mach's lead and concluded that there should be no way to measure—optically or electromagnetically—the speed of rotation, or even detect the rotation of a body with respect to space. If, with General Relativity, Einstein had attempted to demonstrate that the fundamental laws of Physics ought to be the same in inertial and non-inertial, or revolving, frames of reference, why

For A. Compton, the MGP experiment presented a non-significant phase difference and therefore confirmed Relativity because there was no aether-drag that could or should be invoked. With the triumph of this view, a new set of rules had insidiously crept into the game. Relativity now required a null result in both the MM and the MGP experiments, and the door was closed on the matter of the aether.

New Energy Times Archive

should inertial frames be unable to optically measure their translation, but non-inertial frames be able to measure their rotation? The question is all the more poignant as Newton's Law of Gravitation was easily deduced from Kepler's Laws of Planetarian Translation, but remained disconnected from planetarian rotation. Yet, the circular-Galilean or elliptico-Keplerian motion of the planets must be considered to be just as much a form of angular motion as planetary rotation is.

The only possible way for Einstein to explain this seeming contradiction between the presuppositions of SR and those of GR, would have been to assume that c is referred to the inertial axis of the Earth for purposes of translation and thus permits detection of rotation with respect to the same non-revolving axis. But, as we shall shortly see, that is not the route he took. In fact, the route Einstein embarked upon was a tortuous one, utilizing elements that, strictly speaking, were outside of GR, to define Space as the domain of a "gravitational aether," only to end up in a geometric formalism of a Spacetime that serves as an empty container defined by an elastic tensegrity of intervals. But because Relativity, in its restricted form, had largely discarded the problem of rotation from consideration of the null effect of the MM-type experiments, it could appear to be consistent with both electromagnetic detectability of rotation and undetectability of translation, and thus appear to withstand not only this contradiction but also its own ambivalence with regard to the detectability or undetectability of rotation!

The ensuing confusion amongst physicists was so deep that the results of the MGP experiment could advantageously be seen to confirm Einstein's Relativity with respect to rotational motion, irrespective of the outcome of the experiment!—and just as well appeared to confirm the adequacy of Michelson's method to detect the rotary deflection predicted by aether theory. While Relativity was satisfied with the negative result with respect to translation, it was *nearly* indifferent to the results obtained with respect to rotation.

This ambiguous situation was reflected in the ranks of relativists. Those who believed that the positive result from the MGP experiment was significant, like Silberstein, would argue that all it proved was that "the Earth rotates in its axis," precisely what Foucault's pendulum had demonstrated. Those who believed that the result was non-significant, like A. Compton, would conclude that the Earth's rotation had no effect on the speed of light and that the MGP experiment had definitely disproved the aether-drag hypothesis and confirmed Relativity. The latter view has today become the accepted one, and most discussions of the speed of light tests ignore the MGP experiment and feel justified in doing so. Jaffe, in his book *Michelson and the Speed of Light,* gives the matter one paragraph in which he does not even report the findings.

However, at the time, in 1925, the lines were not yet drawn in the sand, and the perplexed and ambivalent state of physicists and relativists alike was translated by the famous *New York Times* headline of January 9, 1925: "Michelson Proves Einstein Theory—Ether-Drift is Confirmed—Rays found to travel at different speeds when sent in opposite directions!"

The paradox could not have been greater.

For the problem is that, if GR is to uphold optical detectability of rotation, even arguing that the inertial frame of reference of rotary motion is the non-revolving axis of the Earth which therefore precludes optical detectability of translation, it must accept the notion of an aether, albeit a non-stationary one. We have seen that Einstein was so inclined, and this likely explains what appears to be a contradiction between the predictions of SR and GR, as his own attempt at relativizing (Special) Relativity itself. Indeed, one could read into this aspect of GR the requirement that an aether must exist; an aether which is in a state of rotation around the planet and is nearly synchronous with the rotation of the latter, a concept akin to that of Stokes' aetherosphere but involving not a drag caused by translation, but an actual rotating aether envelope propelling the Earth forward. Yet, for reasons altogether obscure, Einstein's thought after 1926 made a complete U-turn with respect to this problem, and he ended up by embracing the phenomenological postulates underlying the Special Theory (an effectively empty space occupied by a gravitational field that only in principle is independent from matter) as being the very foundations for a field unification which was, even in his own estimation, unsuccessful.

It is in this sense that A. Compton was ultimately correct—if the results of the MGP experiment are, or were, to be considered significant, they could never be seen as proving Einstein's theory. What was consistent with Mach's principle was the complete inability of an observer to detect either his rotation or his translation by optical reference to a fixed aether. Hence, for A. Compton, the MGP experiment presented a non-significant phase difference and therefore confirmed Relativity because there was no aether-drag that could or should be invoked. With the triumph of this view, a new set of rules had insidiously crept into the game. Relativity now required a null result in both the MM and the MGP experiments, and the door was closed on the matter of the aether.

> *"The ratio of the masses of two bodies is defined in mechanics in two ways which differ from each other fundamentally; in the first place, as the reciprocal ratio of the accelerations which the same motive force imparts to them (inert mass), and in the second place, as the ratio of the forces which act upon them in the same gravitational field (gravitational mass.) . . .It is only when there is numerical equality between the inert and gravitational mass that the acceleration is independent of the nature of the body."*
>
> A. Einstein, *The Meaning of Relativity,* 1955, p. 56

## 2. The Old and New Theories of Gravitation

In Newtonian physics we learned that all bodies, independent of their mass density or weight, fall towards the Earth with the same acceleration. That is, if air were absent so that the Archimedes law of buoyancy could not apply, a feather and a ton of lead would fall with the same acceleration, free fall being proportional to the mass of each body. Newton's Second Law postulates that, if force is constant, acceleration decreases as the mass of a body increases; but, with respect to terrestrial gravity, a body twice the weight of another will have twice the force of gravity pulling it down. As weight and mass effects will cancel each other, gravitational acceleration will be the same or constant in all cases. Released from the same height, and in the absence of air, the feather and the ton of lead *should* reach the ground at the same time.

Newton formalized this relation in the law of gravitational attraction between the masses of two bodies:



New Energy Times Archive

$$F_g = G\,(Mm_g)/d^2$$

where Fg = the gravitational force, G = a constant, M = mass of the Earth, $m_g$ = *gravitic* mass of the object in free fall towards the Earth, d = distance from the center of the Earth to the center of the object in free fall. As the force exerted on an object with *inertial* mass $m_i$ is:

$$F = m_i\,a$$

or the product of *inertial* mass times acceleration, we obtain, *on the condition that gravitational and inertial masses be the same,* the following equation:

$$G\,(Mm_g)/d^2 = m_i\,a$$

which resolves to

$$G\,(M)/d^2 = a$$

In other words, the acceleration of an object under the action of a gravitational field is *independent of the mass* of the object. Having arrived at this conclusion, Newtonian mechanics does not explore it further. But Relativity holds that a gravitational force of attraction expressed by *downward* motion (free fall) is equivalent, for all bodies regardless of mass, to a comparable *upward* linear acceleration of any inertial frame (the elevator analogy) in a gravitational field. Both approaches—gravitational and inertial—to the phenomenon of the free fall of mass are equivalent.

This thought-experiment or, effectively, *this axiomatization, equates therefore gravitational motion with acceleration of inertial frames of reference.* The bottom line of GR's principle of equivalence is that an accelerating reference frame is equivalent to an inertial frame upon which a gravitational field has been imposed. Phenomenologically, GR proposes that there is no way to distinguish between the weight m that "wants to remain behind"—due to inertia, when its frame of reference moves upward—and the weight m being pulled down because of its heaviness (gravitational mass). If the weight of a body is distinct from its mass, that is, if weight is but the effect of attraction of this mass by the Earth (far from the Earth, the body would still have mass, but its weight would be negligible), then it is the mass that determines the weight of the body once a gravitational field is given. Since this defines gravitational or heavy mass, inert mass simply becomes the property of resistance to changes in motion. Heavier or volumetrically denser mass may have a stronger downward pull than lighter mass, yet at the same time the pull has to carry or displace a greater inert mass—hence the fall is not any faster. Because inert and heavy mass are the same, no distinction between accelerated motion and gravitation can be made in General Relativity.

The problematics raised by the Michelson-Morley experiment affects not only the restricted theory of Relativity, but also General Relativity, as it raises the whole question of the equivalence between revolving and inertial or translating frames. Moreover, if the MM experiment cannot be truly considered as a test of SR, the MGP experiment was intended specifically as a test of General Relativity.

The peculiarity of the inverse positions of Relativity vis-a-vis translation and rotation finds its roots in the fact that for restricted Relativity a negative result of the MM experiment was consistent with the notion that the Earth's translatory motion through Space could not be detected; but it was inconsistent with Newtonian mechanics, specifically with Newton's Second Law and his Law of Gravitation. If objects attracted each other with a force that depended on the distance between them, and if action-at-a-distance were true *nonlocality* of action, then the gravitational force could not be subject to the limitation imposed by the speed of light, as enunciated by Special Relativity but now generalized to gravitational fields by GR. This of course raises the problem of the propagation of the gravitic interaction and its relationship with the propagation of electromagnetic disturbances. In this respect, GR also makes a set of assumptions, which can be dissected as follows:

1. The local equivalence of Gravity with acceleration of inertial coordinate systems is considered in the context of a curved extension of flat 4D pseudo-Euclidean Minkowski Spacetime to obtain a pseudo-Riemannian manifold described by a set of tensors that preserve the interval metric and the spatialization of Time.

2. Accordingly, just as the invariant c applies to the propagation of electromagnetic field disturbances for all inertial frames in uniform translation, so does it apply to the propagation of gravitational field disturbances. Hence, GR predicts the existence of gravitational waves or field radiation propagating at speed c.

3. Point masses under no other influence but that of gravitation, follow "time-like" geodesics, whereas light rays under the same conditions form "null-geodesics" of Spacetime.

4. It is the deviation of particles from their "time-like" geodesics which gives rise to inertial effects (a rehabilitation of the Newtonian notion that it is the deviation from straight line motion by an acceleration which produces inertial forces).

To this set of evident assumptions, GR couples a set of hidden or intrinsic assumptions, which bear closer scrutiny. The most important of these are:

1. The *axiomatic assumption that gravitational field energy can be treated,* not only as being ruled by the limit c as an invariant absolute velocity of propagation, but, far more fundamentally, *as reducible to the interval metric structure of Spacetime itself.* From an energeticist perspective, this is an essential metaphysical lapse—emptying gravitation of its energetic content and replacing it with the structure of a manifold which is susceptible to the criticism that it essentially confuses Time with Space. The whole theory also forsakes the Machian designs of "true relationism," by becoming susceptible

Einstein's concept of a curvature of Spacetime has been linked to FitzGerald's imprecise notion of gravity, which postulated that gravity resulted from a change in the structure of the aether caused by the presence of matter.[4]



New Energy Times Archive

to the criticism that it confuses energy and its effects with an axiomatic Form of the continuum.

2. This betrayal of Machian hopes is made final by the fact that in GR the structure of the manifold is not determined exclusively by mass-energy distribution. The distribution of mass-energy in the universe contributes to the determination of the Spacetime metric structure, but the metric itself has axiomatic constraints of its own.

This relativistic somersault, still more fundamentally, raises the question of why classical Physics should have considered rotation as forming a "forbidden" system of coordinates devoid of equivalence with inertial systems. SR established that the laws and concepts of physics are the same for all inertial frames, each inertial frame of reference describing any event with its own set of numbers (x, y, z, t). As there is no extra-special frame, no absolute point of reference, all inertial frames in relative uniform motion must yield the same physical laws. So why should the laws of physics not apply to "non-inertial" frames of reference, such as revolving frames or frames subject to acceleration and deceleration?

This question has a direct bearing upon the MGP experiment. For, an observer on a merry-go-round will not be allowed to deduce the equivalent laws of physics, since its frame of reference is "non-inertial" and allows one to argue that Newton's first law does not apply, as in rotating bodies the direction of velocity is constantly changing. Yet, so argues GR, it is possible to describe the same laws of physics from the rotating observer's viewpoint, if one postulates that what is revolving is not the observer, but the rest of the world around him. This is what Mach was getting at with his principle of the relativity of motion.

Now, this was precisely the ostensive point of Einstein's assault on the matter with his proposal of a generalized Relativity—yet, paradoxically, what the theory ended up doing was to axiomatically establish the absolute character of rotation. With the stated objective that GR should demonstrate how the fundamental laws of physics ought to be the same in inertial and non-inertial frames of reference, whether the latter were revolving or under acceleration, Einstein, between 1908 and 1914, unsuccessfully attempted a treatment of gravitation that was compatible with the special theory. When the final of two such treatments emerged, in 1915, Einstein claimed that it had been achieved at the cost of positing a *new concept of the aether*—as he put it five years later in "Ether and Relativity"[2]—by retaining the speed of light as a cosmic invariant that also applied to gravitational fields. Hence, we find Einstein attacking the hollow and static aether concepts of physicists like Lenard, while invoking Mach to do so—but, and at the same time, we find him going beyond or astray of Mach's positions as well: "the idea of the relativity of force if stated in the form given by Mach, can be used only in connection with rotary motion. Einstein had to extend the idea in such a manner as to make it applicable to *every* motion. He achieved his aim through the principle of equivalence,"[3] at the cost of turning Mach on his head, and admitting to an absolute rotation of Spacetime.

As Einstein adapted it, Mach's principle became expressed in the fundamental GR notion of a curvature of Spacetime determined mechanically by the distribution of matter in the universe (one can no longer speak of distribution in Space proper either) and the kinetic energy of motion of the bodies populating that universe, and determined axiomatically by consideration of the intrinsic properties of the metric tensor. Einstein's concept of a curvature of Spacetime has been linked to FitzGerald's imprecise notion of gravity, which postulated that gravity resulted from a change in the structure of the aether caused by the presence of matter.[4] Yet, as Whittaker has indicated, FitzGerald was "actually thinking" of alterations in the dielectric constant and the magnetic permeability of the space surrounding the mass of a body, "by analogy with the fact that in a liquid whose dielectric constant varies from point to point, an electrified body moves from places of lower to places of higher dielectric constant."[5]

But Einstein's new theory of gravity in GR, as elaborated in 1913-1914 in two papers with the Swiss geometer M. Grossmann, replaces the Newtonian notion that gravity is a force operating on masses across empty and absolute Space, with the notion that gravity is a modification of the geometry of Spacetime. Einstein and Grossmann suggest that the translatory motion of a particle "in the free aether" but "in the absence of any field," would be described by

$$(ds)^2 = c^2(dt)^2-(dx)^2-(dy)^2-(dz)^2$$

thus proposing that the path of a body in free fall in a gravitational "field" is a geodesic in 4D Spacetime, with a metric defined by the quadratic differential equation

$$(ds)^2 = \sum_{p,q=0}^{3} g_{pq}\ dx^p\ dx^q$$

Here, the gravitational "field" ceases to be the attribute of a single scalar potential-function to become specified instead, in tensor calculus, by the ten coefficients of $g_{pq}$ (the "gravitational potentials") which determine both the scale of length in every direction and the length-equivalent rate of clocks. *Einstein was in fact operating a reduction of gravitational theory to geometry, and precluding therefore any recourse to the notion of gravitational energy.*

It is indeed curious how the attempt at a General Theory by Einstein in 1915, which aimed at defining a *new concept of the aether,* ended up by treating the gravitational field as a mere question of geometry. Force, in the Newtonian sense, is no longer involved nor propagated; the body that falls or moves from one place to another only does so by the shortest route, the geodesic. The reduction of gravity to a metric of Spacetime effectively empties Space of energy and permits *exclusive identification of physical energy with the electromagnetic field.* In defining the "new physical characteristics" of the continuum, instead of realizing that Space devoid of electromagnetic ener-

In 1954, a year before his death, Einstein wrote to Besso: "I consider it quite possible that physics cannot be based on the field concept, *i.e.* on continuous structures. In that case, nothing remains of my entire castle in the air, gravitation theory included, and the rest of modern physics."



New Energy Times Archive

gy is not Space devoid of energy, Einstein defined formally the force of gravity as a mere geometric property of the fabric of four-dimensional Spacetime, ignoring thereby any possible functional treatment of gravitational energy as such.

From our perspective, this was in all likelihood an inevitable and necessary mistake of GR. Despite Einstein's claim that, "We therefore arrive at the result: the gravitational field influences and even determines the metrical laws of the space-time continuum,"[6] the field remains conceptualizable only by the pseudo-Riemannian manifold, which, on its own, fails to analytically treat the difference in dimensionality between Space and Time, fails to differentiate between them as distinct manifolds, and fails to account for them as the intrinsic properties of energy in flux. To hold the field as determinant of the metric, when the metric is intervalar and the field a mere geometric extrapolation, effectively constitutes a method to empty both the field and the metric of energetic considerations. The problem harks back to the topological concept of a continuum as it was first enunciated by SR—it does not even satisfy full consideration of matter as electromagnetic energy in the "energy tensor of matter," "even if matter is to be regarded as the principal part of the electromagnetic field," because it limits itself to the principle of addition of flattened dimensions. And although one might still hold, as does GR, that the gravitational field transfers energy to that matter or, to paraphrase Einstein, gives it energy, nonetheless this gravitational field, too, becomes defined by the same principles of Gaussian geometry. The problem, we think, lies right at the heart of the relativistic concept of the continuum. Einstein's impetus to develop GR, his proposal of a ZPE continuum, his drawing attention to de Broglie's wave-mechanics and his several attempts at a unified field theory (UFT) all betray his relentless search for continuous structures that would link the quantum discontinuities. In 1954, a year before his death, Einstein wrote to Besso: "I consider it quite possible that physics cannot be based on the field concept, *i.e.* on continuous structures. In that case, nothing remains of my entire castle in the air, gravitation theory included, and the rest of modern physics."

And in his last writing, the second Appendix to "The Meaning of Relativity," Einstein distanced himself from attempts at "quantization" that reduce to a statistical theory of field probabilities, treating essentially non-linear phenomena by linear methods, even though he also acknowledged the possibility that quantization itself might yet disengage an algebraic theory which could preclude his complex tensor theory of a continuous field. Most institutional physicists today see this as a recognition, by Einstein, of the mere epiphenomenological reality of a continuum. Yet Einstein's admission of failure related quite specifically to a *field* theory of the continuum, not necessarily to any theory of the continuum.

It is not our objective in the present communication to provide alternative views to those of relativity. While we have misgivings concerning SR's approach to the problem of the manifold(s), specifically regarding the spatialization of Time as a condition for its geometric treatment, the proposed "geometrism" also suffers from intrinsic or immanent difficulties. By the time that the problem is formulated as a mere matter of flat topology, and that alone, energy dynamics has been expurgated. The very demonstration of the equivalence of inertial and gravitational mass (what Einstein once called "an astonishing fact") falls short of its objective, and manages to address what is solely a formal distinction, since it is the same mass that freely falls in a gravitational field and that resists changes in motion. Indeed, no real understanding of force, whether inertial or weighty, can be forthcoming unless one succeeds in treating the gravitational field as a continual exchange of graviton particles (be they quantic or subquantic). One could then grasp a physical sense to the dual reality of inert mass, seat of inertia and mass-energy, and gravitational mass, seat of the graviton energy as a necessary double of inertial mass. And one may then, at last, come to where W. Reich stood, when he enunciated the dimensional equivalence between mass and length, which the gravitational pendulum has long demonstrated but our understanding has failed to grasp. Indeed, an atom of mass-energy by gaining a graviton does not thereby gain twice its mass, but only affects to its mass a wavelength that defines the characteristic graviton unit associated with it in every gravitational field, and independently from local values of g. Alas, no topological treatment of an equivalence ($m_i\ a = m_g\ g$) that remains obscure, could replace an energetic approach that construed graviton energies from first principles and bench experiments. But this is a matter that we leave for another occasion.

> *". . . The null geodesics are the tracks of rays of light. When Einstein created his new general theory of relativity, in which gravitation was taken into account, he carried over this principle by analogy, and asserted its truth for gravitational fields. . . .Strictly speaking there are no "rays" of light—that is to say, electromagnetic disturbances which are filiform, or drawn out like a thread - except in the limit when the frequency of the light is infinitely great: in all other cases diffraction causes the "ray" to spread out."*
>
> E. Whittaker, *A History of theTheories of Aether and Electricity*, Vol. II, p. 165

### 3. Generalized Relativity and the Problem of Rotation: The Dragging of Spacetime

Why then should GR predict a positive result for the MGP experiment and not a null result, as for an MM-type experiment, when Mach's principle—which it *pretended to generalize*—was first enunciated for rotation rather than translation? Shouldn't GR reject the idea of measurability of absolute rotation or nonrotation, just as SR rejected the idea of measurability of absolute translation?

> It was as if, once the relativistic orthodoxy was formed, relativists had become embarrassed to admit that Einstein was now calling for a "gravitational aether" in the form of a drag effect(!) clearly borrowed from aether-drag theory but this time applied in a relativistic fashion to "the Spacetime" of rotation. Unproven until this day, the relativistic notion of the dragging of revolving frames as an explanation for gyroscopic precession appears to stretch the Machian logic of Relativity beyond believability.



New Energy Times Archive

This problematics has direct bearing upon the conceptual and practical distinctions between the Michelson-Morley type experiments (including the later Miller experiments) and the Michelson-Gale-Pearson experiment. The MM result is negative, but precisely with respect to the problem of translation of the Earth. Yet, *when the rotating reference frame ceases to be the frame of the apparatus itself,* as it is in the MM experiment and the Miller experiments, *and instead becomes the Earth,* as in the MGP experiment, then it becomes possible to optically measure varying speeds for the propagation of light. Why?

The answer is tied to some very obscure elements of Einstein's theory which deal with the precessionary behaviour of gyroscopes as a function of the curvature of Spacetime (the gravitational "field") predicated upon the presence of mass. Two effects were proposed by Relativity to explain gyroscopic precession:

1. The de Sitter geodetic effect involving deformation of parallel axes caused by the curvature of Spacetime, and

2. The so-called "relativistic dragging of inertial frames" which proposes that, in the neighborhood of a rotating body, Spacetime itself becomes "dragged" along with the rotation.

H. Thirring in 1918 and 1922 suggested that Einstein's theory of gravitation, or GR, should be taken to indicate that the spontaneous orientation of gyroscopes and the phenomenon of atmospheric wind could be treated as if the Earth were stationary (not rotating) and "the distant stars" were moving around it at a speed high enough (>>c) to generate strong gravitational effects (fictional centrifugal and Coriolis forces). Clearly, this was thought of as an embodiment of Mach's principle, and it was applied even to systems of moving coils in order to establish the principle of equivalence of magnetic and electric charges, *i.e.* moving and static charges. Yet, GR betrays this Machian principle of equivalence when it assumes that spinning the observer's laboratory or spinning the total mass of the universe around it are not exact physical equivalents because rotation of the laboratory frame is, strictly speaking, "at the limit," non-inertial, and only the rotation of the Spacetime shell, the dragging of Spacetime caused by the rotation of the total smoothed out mass of the universe, is absolute.

According to the Newtonian theory of gravitation, the interior of a rotating shell of gravitational mass is free from gravitational forces, with the result that if a gyroscope could be placed within it, with its axis perpendicular to the axis of rotation of the shell, it would not precess as it would be free from the effect of gravitational forces. Now, with GR, we obtain the same result, unless, and only unless, the notion of a dragging of the inertial frame is introduced. This now permits the prediction that a gyroscope enclosed within that rotating shell of mass will, in fact, precess in the same direction as the rotation of the shell. If we exclude the "relativistic dragging of inertial frames," the generalization of Relativity would have demanded precisely that no fringe shift should be observed due to the rotation of the Earth, because any and every motion has no preferred frame of reference located in space. Furthermore, GR holds that the gravitational field, being directed toward the outside of the shell, only affects rigid rods and clocks external to it, in its surrounding Spacetime. If we abstract from the dragging of inertial frames, then it would be correct to argue, as has many a "true" Machian disciple of Relativity, that it should not matter whether we hold that the universe (the distant stars) is nonrotating and the Earth is rotating, or that the Earth is nonrotating and the universe is rotating.

Assuming that the Earth's inertial frame coincides with its axis of rotation, Thirring predicted that an inertial frame at the Earth's north pole would appear to be rotating with respect to the distant stars because rotation of these stars induced a dragging effect by deformation of Spacetime next to the Earth. In sum, GR should propose that a body, such as the Earth, actually "rotates" (though only in a relative sense) because the Space-Time around it is dragged along by a small degree that relates to the mass-density of the body but is induced by the rotation of the shell of the universe (the absolute rotation of the smoothed out total mass of the universe). This implies that the axis of rotation of the Earth is "dragged along" by the rotation of the planet and therefore itself rotates (even if very slowly) with respect to the distant stars. Relativistic dragging of Space-Time, now known as the Lense-Thirring effect, was next highlighted in 1923 by Eddington, who suggested that it formed a verifiable prediction that proved the relativity of rotation, and this in turn inspired Silberstein's proposal with regard to Relativity's requirement of a positive fringe shift in the MGP experiment. This was a curious situation indeed, for classical aether theory had never once bothered to address the problem of rotation and its effect upon optical propagation, leaving behind an unoccupied problem that GR now made its own. This classical omission had even been the basis of Joos' attack[7] on the believers of aether drag theory, to the effect that they had overlooked rotation in their argument for a "partial aether drag," which they saw as caused exclusively by translation with respect to absolute Space.

Since this relativistic dragging of inertial frames, which is deemed to be an effect even smaller than the geodetic effect, was not taken seriously by institutional physicists until Dicke's theory in the mid-1960s reformulated it, the MGP experiment and its results effectively lost all interest, even for GR. It was as if, once the relativistic orthodoxy was formed, relativists had become embarrassed to admit that Einstein was now calling for a "gravitational aether" in the form of a drag effect(!) clearly borrowed from aether-drag theory but this time applied in a relativistic fashion to "the Spacetime" of rotation. Unproven until this day, the relativistic notion of the dragging of revolving frames as an explanation for gyroscopic precession appears to stretch the Machian logic of Relativity beyond believability.

If the postulate of the "dragging of inertial frames" alone "guarantees that rotation must be defined relative to distant

When we read the words the apologists of General Relativity write today on this matter, we may well get so helplessly confused as to conclude that if we do not understand Relativity, then it must be a very profound theory.



New Energy Times Archive

matter, not relative to some absolute space,"[8] then, despite all the noise to the contrary, what GR, or, more properly, its extension, is proposing is simply tantamount to the assertion that there is absolute rotation. Clearly, Mach's principle is denied, once we claim that we can actually detect rotation because the axis of the inertial frame is rotating relative to the distant stars. Moreover, if the dragging is invoked with respect to the motion of the revolving frames—and one can see little reason why it should not be equally applied to inertial frames in translation, given that the planetarian ellipses of translation around the Sun are equally "explained" by the distortion of the geodesics caused by the mass of the Sun—then Relativity should be predicting a phenomenologically stationary and deformable aether, not precluding it. The same criticism that Joos addressed to the partisans of aether drag theory could be addressed to the partisans of Relativity—though in reverse: why should *rotation be measurable* because of a Spacetime drag of inertial frames (*e.g.* the gyroscope's axis) in rotation, and *translation remain unmeasurable* and unable to elicit the dragging of its own inertial frame, when translation is also a gravitational motion and there must be equivalence "in principle" between inertial and non-inertial frames?

This positioning of GR with regard to the problems of gravitation and rotation strike at the heart of an old conflict in astrophysics and cosmology. The Ptolemaic conception of the world placed the Earth at its center and the Sun, planets, and other stars in orbits around the resting Earth. But Copernicus with his circles and Kepler with his ellipses showed that the Earth revolved around the Sun, which now appeared stationary. With respect to the question of rotation, Whittaker has sternly indicated that it is a mistake to regard the Einsteinian GR theory as indicating that the "Ptolemaic" conception, which says that the stellar universe performs one revolution around the Earth in the period of a day, is any more valid or invalid than the "Copernican-Keplerian conception," which says that the Earth rotates on its axis orthogonal to the equatorial plane, because GR would hold that only the Copernican-Keplerian axes of the planets are inertial, while the Ptolemaic axes are not. It is only with respect to inertial axes that GR permits the description of the Earth as rotating, with the result that c is only invariant with reference to inertial frames. Hence, "there is no difficulty in the fact that the fixed stars have velocities *greater* than c with respect to axes fixed in the rotating Earth, for such axes are not inertial."[9] They are not considered to be inertial by GR, and c is not to be measured with respect to them. . .

When we read the words the apologists of GR write today on this matter, we may well get so helplessly confused as to conclude that if we do not understand Relativity, then it must be a very profound theory. For it claims subreptitiously that there are relative and absolute rotations, absolute rotations (of the ensemble of distant stars and the Spacetime envelope) which are relative to the inertial effects of frames in translation—and, at the same time, appears to claim that all motion is relative, and none is absolute, including rotation or non-rotation! Witness Clifford Will, great panegyrist of GR:

> If you ask yourself, "Am I rotating?" and you wish an answer with more accuracy than you can get simply by seeing if you are getting dizzy, you usually turn to a gyroscope, for the axis of a gyroscope is assumed to be non-rotating relative to inertial space. . . If your laboratory happened to be situated outside a rotating body, the gyroscopes would rotate relative to the distant stars because of the dragging effect. . . Therefore, your laboratory can be non-rotating relative to gyroscopes, yet rotate relative to the stars. In this way, general relativity rejects the idea of absolute rotation or absolute non-rotation, just as special relativity rejected the idea of an absolute state of rest . . . The existence of the dragging of inertial frames then guarantees that rotation must be defined relative to distant matter, not relative to some absolute space. This is what makes the detection of this effect so vital [for Relativity].[10]

Relativist loops are a conundrum. First you are told that SR rejects the idea of an absolute state of rest, yet, by the same token, there is an inertial frame for every body in motion (relative to other bodies. . .) with respect to which that body is always and *absolutely* at rest! But then, when relativists apply this principle to a terrestrial laboratory, they act as if they forgot that any and every terrestrial laboratory is not at rest with respect to the Earth's inertial axis, nor, therefore, with respect to the inertial frame of translation, but revolving around it, in a frame of rotation superimposed over the translatory motion.

How then can one pretend that a gyroscope axis is non-rotating relative to inertial Space? And what is the rotation of distant matter, but a euphemism for the rotation of an absolute Spacetime, the stand-in for Spacetime? To begin with, a qualifier is required to define which inertial Space, such as *the Earth's* "inertial Space," otherwise our relativist soon sounds like a nineteenth century defender of the most static of aethers. Moreover, only if the gyroscope were rotating in "free Space" (away from any revolving body) could one pretend that its axis was non-revolving with respect to its own inertial Space, for there would be no other nearby inertial Space to refer it to. But next comes the obvious problem: a gyroscope, on or near the Earth, whose axis is parallel to the Earth's axis of rotation, *is still rotating with respect to that axis* and rotating, just as well, with respect to the Earth's inertial axis of translation, which axis in fact does not coincide with the Earth's equatorial axis of rotation.

The relativist appears to be all balled up, only to conclude that the same laboratory can be non-rotating relative to the gyroscopes, yet rotate relative to the stars! Yet if the gyroscope rotates and preserves its attitude, it obviously does so relative to the local revolving frame of the laboratory, which evidently, and despite all attempts of GR to confuse the issue, is not revolving around the rotating gyroscope, but revolving around the Earth's axis, and so is the gyroscope whose axis is "at rest in" the laboratory revolving frame!

Relativistic metaphysics was born this way—in the Hegelian fashion of rehabilitating the old under new clothes. Little wonder that in his 1920 criticism of GR, Whitehead claimed that it had made *rotation,* and specifically, the Earth's rotation, *into a mystery* by introducing the notion of a curvature of Space-Time.[11] (We wonder, however, whether the paradoxes of rotation have not legitimately arisen well before Relativity.) If we should assume that a gyroscope within a gravitational mass shell would still precess in the direction of the Earth's rotation, surely the gyroscope would rotate around the Earth's equatorial axis, remaining therefore well within the gravitational field of the rotating shell.



New Energy Times Archive

This is the physical hiatus regarding rotation, for it implies that inertial motion may or may not be equivalent to the motion caused by the gravitational "force" or the "field." In other words, not every translation, said to be an inertial displacement, is equivalent to every other translation. When SR departs from the assumption of the equivalence of all inertial frames of translation, it jumps from: 1) the situation between a stationary observer on the revolving frame of the Earth and a passing train which moves relative to that revolving frame *and* to the observer; to 2) the situation of the translation of the planets around the Sun. But right here there is a vitiation of the first postulate, a vitiation which is further occluded by GR, for the motion of the train is inertial but subject to the gravitational field of the revolving frame (*i.e.,* subject to the gravitational "field" of the Earth), whereas the motion of the Earth "around the Sun" is not simply inertial, but above all a gravitational motion whereby the Earth deploys its own gravitational "field" in the context of that deployed by the Sun and the other planets, in the form of a superimposition of "field" energies. Furthermore, the translatory frame, though appearing to have uniform speed, is in fact undergoing periodic accelerations and decelerations. The problem at hand is of the same order that led us to state that no aether drift is to be expected if the aether around the Earth *moves with the Earth, in the same direction as the Earth's rotation.* In fact, if it moves *with* the Earth it is likely that it is *what makes the Earth move.* Einstein might say what he says, but if the train accelerates and decelerates, it is only the coffee in the cups aboard it that will spill over and splash, not the coffee in the cups held by the onlookers. Surely, it is the inertial motion of the train that gives rise to those effects, when superimposed over the gravitational field of the Earth. It therefore cannot be accurate to regard a description of the way in which the train moves on Earth as if it was equivalent to a description of the Earth moving inertially under the train. The train (or the moving elevator, for that matter) does not deploy its own gravitational field, only inertial mass *within* the gravitational "field" of the Earth. The train alone moves inertially with respect to the Earth, not the Earth with respect to the train. Hence, the train remains subject to the law of free fall when it must exert energy both to climb uphill and to brake going down. And if a bridge fails, the train will crash onto the Earth. Not so with the Earth, which is not subject to free fall into the Sun, or into the train, for that matter, and whose "inertial motion" is not supported by bridges or rails. The translation of the train on the Earth does not involve rotation of the train on any of its axes; that of the Earth around the Sun does, and its axis of rotation is not the same as its axis of inertia or, for that matter, as the axis of its translatory motion. In other words, the equivalence of inertial frames sought by SR already abstracts from the fact that the inertial frames it considers are all subject to the same gravitational frame, and are therefore not equivalent to inertial frames that define their own gravitational frame by virtue, precisely, of their rotation, or something powering their rotation. It fails therefore to grasp the physical process that generates gravitational fields associated with the motion of inertial frames.

> The problem is that the "aether" that Einstein increasingly appeared to have in mind, rather than becoming, as promised, a "non-material, non-mechanical, and gravitational aether," became instead a pure *metaphysical fiction,* a disembodied physical reality endowed solely with a mathematical existence.

To deny the reality of the aether would be, to use Einstein's own words as they appeared in his analysis of General Relativity, to assume that Space empty of matter has no physical qualities. According to GR, Space always has physical characteristics, therefore an aether must exist, though this aether is no longer stationary, as it was for the luminiferous theory, for the corpuscular theory, or for Maxwell and Lorentz: "this conception of the ether to which we are led by Mach's way of thinking differs essentially from the ether as conceived by Newton, by Fresnel, and by Lorentz. Mach's ether not only *conditions* the behavior of inert masses, but it is *also conditioned* in its state by them."[12] With GR, "the conception of the ether has again acquired an intelligible content, although this content differs widely from that of the ether of the mechanical undulatory theory of light."[13]

So wrote Einstein, yet Mach never once, for a moment, entertained the notion that there was an aether, or some other form of aether! Nor, for that matter, did General Relativity *per se* entertain such a notion. Einstein had in fact reserved this problem for his Hermitian theory of the unified field, hence the speculations entitled "Sidelights on Relativity."

What Einstein did not make clear in those sidelights was that he was naming as physical, properties which were strictly determined as geometrico-mathematical axioms simply assumed for the sake of logico-mathematical consistency, but which resulted in undecidability on the part of the theory towards its physical objects of study. In Einstein's understanding at the time, the aether of GR, unlike Lorentz's aether, was only partially determined by its connections with matter and the state of the aether in neighboring places. This permitted him to argue that the nature of the aether of GR is neither electromagnetic nor mechanical: "the aether of the general theory of relativity is a medium which is itself devoid of *all* mechanical and kinematical qualities, but helps to determine mechanical (and electromagnetic) events."[14] As we can easily conceive of Space devoid of an electromagnetic field but not one devoid of a gravitational field, the former has a secondary connection to the aether,[15] whereas the relation of the gravitational field to the aether is a foundational one. However, this relation is far from being conceived as a physical foundation *per se*, an energetic function; it is in fact taken as an axiomatic relation, a logico-mathematical foundation that poses a geometric constraint. Hence, one cannot be deluded by Einstein's suggestion that, as matter is but varied condensations of the electromagnetic field, the relations between the "gravitational aether" (the expression is Einstein's) and the electromagnetic field are the very relations between *Space and matter.*

It is here, at last, that we can see the basis of the confusion which condemns Einstein's "gravitational aether," it too, to abominable failure. Einstein is keenly aware that Maxwell's notion of a non-mechanical *electromagnetic* field pervading

New Energy Times Archive

Space empty of matter is not tenable, precisely to the extent that this field is *secondary* to a "primary field," the gravitational "field." If matter is but condensation of the electromagnetic field, it also becomes obvious that matter cannot explain the gravitational "field," as the latter is supposed to exist already in the absence of the electromagnetic field. Something other than matter must define the gravitational field in a universe empty of mass, but this something—in Einstein's eyes—will turn out to be not energy, but the metric of a pure, but fuzzy, form, a topological continuum.

Having arrived at that conjuncture, Einstein would either have to predict that there was another form of energy, *gravitational energy*, whose detection should be made possible by kinetic and (primary) electric effects in Space *empty of matter,* or he would have to retrench by reducing this "gravitational aether" to a mere geometric form of Spacetime partially determined by the distribution of matter. This is what led to the notion that there must be, in space, *gravitational waves* moving at speed c, as these waves must ostensibly arise from local readjustments of the Space-Time curvature when the motion of massive bodies warps the undisturbed continuum.

Why it was not similarly assumed that the continuum itself is in motion, becoming distorted when meeting stationary objects, remains undisclosed to this day. . . For the fact of the matter is that it is equally limited to hold that the stars rotate but not the Earth, or vice versa, that the Earth rotates but not the stars, or even that both are true propositions because their mathematical descriptions are equivalent and the physical effects either gives rise to are interchangeable. For the simple reason that it is invalid to suppose that, at any time, the Earth or the stars are fixed or non-rotating. Special Relativity introduced this artificial suspension of thought by restricting itself to the problems of inertia and translation and ignoring gravity and rotation; but why should we generalize a physical relationship when this demands that we assume an obvious error—that either the Earth is non-revolving or the stars are fixed—in order to arrive at an equivalence between two equally erroneous points of view? The correct premise should have been to assume the obvious: that both have peculiar rotary and translatory motional components.

This is the story of how the 4-D topological model of a supposed gravitational aether, devoid of physical properties and divorced from any energetic conception, came to be accepted and identified with pure empty Space, the Void, defined exclusively by the negative, by the absence of matter. What then are the physical properties of this "empty Space aether?" That it has curvature, even in its small t time or lack thereof?

These are the facts and considerations that will lead any mind which is still open to examine the problem of the aether and Relativity, to become suspicious of Einstein's utterances about *an aether compatible with* Relativity. The problem is that the "aether" that Einstein increasingly appeared to have in mind, rather than becoming, as promised, a "non-material, non-mechanical, and gravitational aether," became instead a pure *metaphysical fiction,* a disembodied physical reality endowed solely with a mathematical existence. Instead of discovering a dynamic aether comprised of non-mechanical and electrogravitic properties, Relativity ended up with a pure geometric form set in an imaginary four-dimensional Spacetime. And this fiction succeeded in the minds of physicists because it became metaphysically

The current *imperium* of relativistic truth has been selected by social and political criteria that are entirely foreign to science itself, as *sciens,* as knowledge that is factual cognition.

endowed with *mechanical* properties, courtesy of the dictatorship of the absolute speed of light. Hence, the curvature of space remains a function of matter, and when the matter required to explain this curvature is found to be "missing," recourse is taken to the expedient explanation that it is missing no longer but has miraculously been "born-again" as black or invisible (*i.e.* undetectable) mass. . . It is here that Relativity ceased being a scientific theory, to become an academic doctrine bandied about with the same arbitrariness as any other religious vision of the world. A platonic metaphysics of the form.

It is physical nonsense to speak of a pure Space devoid of matter *and* energy. Such a pure Space is not an aether, but a meta-aether, a metaphysical aether, like the Ur-Aether of Lenard. And whether we call it the void of Spacetime and write it in four dimensions, or call it meta-aether and retain Euclidean Space as pure container, it remains a metaphysical abstraction. From a strict physical viewpoint, only an energeticist position can make sense. While Space and Time may be considered to exist outside the function of matter, independently from it, *they cannot be conceived outside the function of energy.* To suppose otherwise implies *tout court* that Space and Time cannot be physical concepts, nor actual functions, and are *ipso facto* condemned to become mere apparitions of physical reality, mere mathematical and geometric fantasies with no practical value other than the political importance that social formations arbitrarily decide to lend them. Obviously this means that the current *imperium* of relativistic truth has been selected by social and political criteria that are entirely foreign to science itself, as *sciens,* as knowledge that is factual cognition.

> *"The great attraction of the theory is its logical consistency. If any deduction from it should prove untenable, it must be given up. A modification of it seems impossible without destruction of the whole."*
>
> A. Einstein, *Out of My Later Years*, p. 58

## 4. The 1913 Sagnac Attack on Relativity

### 4.1. A Perspective on the Sagnac Experiment

The notion of a stationary aether, in all its variations, ruled over nineteenth century Physics. This was not simply and merely due to the domination of the undulatory wave theory of light. In one fundamental respect, adherents of both the corpuscular theory and the undulatory theory agreed—that motion had an absolute frame of reference in the stationary structure of space. The question of whether this absolute space was empty but populated by corpuscles, or whether it was gel-like and criss-crossed with undulations, was the core of ongoing dispute.

Few realize today that what began undermining this dispute and its very foundation was not really Relativity, or the MM experiment, but Faraday's research and Maxwell's electromagnetic field theory. These influences could actually

New Energy Times Archive

When difficult questions, such as those posed by the MGP or the Sagnac experiments, arise, they are simply swept under the rug with the ready-made excuse that the topic falls outside of SR and is not, therefore, within the MM rubric. This is indeed the reason resorted to by all those who fail to mention the Sagnac experiment in the context of a discussion of the MM experiment. . .These omissive procedures of institutional science are an integral feature of the constitution of modern Physics, as it operates veritable molar lines of thought and financing in its investigations, leaving its own operational paradigms riddled with holes that have a long-term impact.

be considered to have provided the first openings in classical physics for an energetic perspective—keeping in mind that in Newton's time the very concept of energy was not known. With the work of Maxwell, we have for the first time a comprehensive answer to the connection between electric, magnetic, and optical phenomena, where the speed of light already plays the role of an invariant for the propagation of the field pattern; hence the notion of radiative flux as electromagnetic field energy. But this first unification of Physics, which one can denote as the classical electromagnetic theory, also contributed another element, far more corrosive of the classical luminiferous aether theory—the notion that the energy filling up space was distributed in the *non-mechanical* form of a continuous and non-material field. The filiform wave definition of the propagation of electromagnetic disturbances involved only continuous radiation fields and required the symmetric orthogonal disposition of magnetic and electric fields, both perpendicular to the direction of propagation. The very notion of high-frequency displacement currents responsible for electromagnetic induction, in Maxwell's theory, required the concept of a medium for their field propagation.

Maxwell, however, had failed to foresee the fundamental developments that would decode classical Physics at the beginning of the twentieth century: specifically, the introduction of discontinuity into the theory of electromagnetic radiation, and the rise of Special Relativity, predicated on the null result of the MM experiment—now taken to indicate that there was no stationary medium filling up Space, nor any reference to absolutely inertial Space. However, if the former development was largely an experimental one which threatened the entirety of the classical edifice, the latter development was essentially a theoretical one which suffered from tremendous limitations. Two of these limitations have been highlighted in the paper which appeared in Issue No. 38 of this magazine: the artificial delimitation of SR to the problem of the electromagnetic detectability of translation, and its corollary of a complete inability to address the question of rotation; and the negation of a mechanical, stationary substance of Space with its corollary of the invariance of c for all inertial or Copernican frames. In other words, SR had left open the questions of rotation, gravitation, and the possible existence of a dynamic aether. But it had also precluded the notion of this dynamic aether being equivalent to Maxwell's non-material electromagnetic field.

To deal with the limitations of SR, Einstein enunciated the framework of GR—in an attempt to provide a relativistic treatment of gravitational "forces" as equivalent to the centrifugal forces developed by stable rotation. The linked problems of a "gravitational aether," gravitational waves, and the dragging of inertial frames by the curvature of Spacetime, were only addressed later—by Einstein and others—mainly in the wake of the end of World War I, and this led directly to Silberstein's proposal to test SR by Miller's repetition of the MM experiment at altitude to detect the Earth's translation, and test GR with the MGP experiment to detect the Earth's rotation. At that time, Relativity appeared to have successfully occupied the domain of rotation apparently abandoned by the defenders of the old aether theory. Subsequently however, as we have also examined, the ambiguity of the MGP results led to an effective abandonment of interest, both theoretical and applied, in the subject of rotation and the adequacy of GR to explain it. This situation has prolonged itself to this day, assuming very curious forms of scientific repression. When difficult questions, such as those posed by the MGP or the Sagnac experiments, arise, they are simply swept under the rug with the ready-made excuse that the topic falls outside of SR and is not, therefore, within the MM rubric. This is indeed the reason resorted to by all those who fail to mention the Sagnac experiment in the context of a discussion of the MM experiment.

These omissive procedures of institutional science are an integral feature of the constitution of modern Physics, as it operates veritable molar lines of thought and financing in its investigations, leaving its own operational paradigms riddled with holes that have a long-term impact. A case in point is the Sagnac effect, which was first reported by Sagnac in 1913 and was utterly discarded, ignored, and ridiculed until 1932, when it came to be utilized, under the impetus of World War II, in military navigational systems. To this day, the Sagnac effect has remained largely unknown to most physicists, and is almost completely absent from the discussion of the problematics of the aether and Relativity. Yet, a few hard-core defenders of the theory of the stationary aether, some because of religious motives, others for good experimental or theoretical reasons, have taken shelter in the Sagnac effect and have launched, from there, their own missiles against official Relativity. Why? Because the Sagnac experiment was and is one of those gaping holes in the paradigms of SR—and, by extension, of GR. The actual experiment was described in two consecutive papers published on the eve of World War I, two years before Einstein would address the question of rotation in GR, and it directly faulted SR for having been unable to address rotation. Specifically, Sagnac's discussion focused on how the rotary motion of a body may be optically detected, and how the experimental values appear to confirm the Newtonian addition of speeds and not the relativistic addition.



New Energy Times Archive

### 4.2. The 1913 Sagnac Experiment

The omission of Sagnac's experiment in the context of GR is all the more glaring as Sagnac was the first self-styled "luminiferous aether" theorist to have occupied the terrain of rotation, effectively voiding Silberstein's notion that, on the matter of rotation, the stationary aether theory had nothing to offer and thus should not expect rotation to be detected. In fact, Sagnac addressed the question of rotation before Einstein did. Keeping this in mind, let us examine briefly the Sagnac experiment.[16] The apparatus employed by Sagnac is, like the interferometer of the MM experiment, a rotating one. However, Sagnac's device has a number of critical differences, beginning with the fact that it is the entire self-contained apparatus which rotates with angular velocity $\omega$. Light source, collimator, beam-splitter, light pencils, and mirrors were all mounted on a spinning disc with a 1m radius and rotating about once per second. Essentially, a monochromatic light beam is split, with the transmitted beam propagating in an anticlockwise direction around the polygonal mirror course, and the reflected beam propagating clockwise through the same circuit. The two beams are then recombined and focused on a photographic plate, permitting measurement of fringe shifts with little possibility of error.

Sagnac obtained his control interference fringes with the apparatus stationary and observed that, once the apparatus was set in motion, the fringes shifted, thus indicating that the speed of the two light signals through the circuit was not the same. When the turntable was rotated in one direction or its opposite, the fringe shift moved to opposite sides of the stationary fringe. Sagnac gave the difference in the number of wavelengths of the two paths as

$$\delta = 4A\ \omega\upsilon/c^2 = (L/\lambda_1) + (L/\lambda_2)$$

where $A=\pi r^2$ is the circular area of the path traveled by the light, $\omega$ is the angular velocity of the turntable, $\upsilon$ the electromagnetic frequency ($c/\lambda$), and $L = 2\pi r$, the circular path traveled by light for a single rotation of the disc. This is known as the closed-loop Sagnac effect. A full fringe shift required a rotational speed of 13 m/sec; and Sagnac reported a shift of 0.07, corresponding to 0.91 m/sec. Relative to the rotating interferometer, the propagation of light was observed to vary by an amount which depended upon whether the beam was traveling in the same direction as that of rotation, resulting in retardation, or counter to it, resulting in an advancement. Here was positive evidence that "the observed interference effect is certainly due to the rotational optical effect of the movement of the system with respect to the aether."[16] If the speed of light propagation for each arm of the circuit were the same and no fringe shift had resulted, one would have had to reach the same conclusion that SR came to regarding the MM experiment. But the observed shift indicated that the speed was c+v on one arm and c-v on the other, where $v= \omega r$ is the tangential speed of the rotating interferometer relative to the laboratory frame. It follows therefore that

$$\delta = 4A\ \omega\upsilon/c^2 = (2L/\lambda)\ (v/c)$$

and

$$\lambda_1 = \lambda/(1-v/c)$$

$$\lambda_2 = \lambda/(1+v/c)$$

The Sagnac experiment detects the rotation of the revolving interferometer (relative to the "rest state"), whereas the MGP experiment, with its interferometer fixed to the local revolving frame, detected the rotation of the Earth.

Two months after publication of the first paper, Sagnac would conclude his second and final paper on the matter with these words: "The result of this methodology demonstrates that, in the surrounding space [of the apparatus], light is propagated with a velocity $V_o$ which is independent of the movement of the parts of the system, light source. . .and the optical circuit."[17] This is the central theme of Sagnac: that the propagation of light appears to be independent of the state of rotation of his self-contained apparatus, exactly because one can differentially measure its advance or retardation as a function of the speed of rotation of the apparatus.

What is the consequence of the Sagnac experiment for the MGP experiment? To begin with, Sagnac's apparatus was rotating (with the control fringe pattern being obtained first with the apparatus "at rest"), whereas the MGP setup was a stationary one. This fact is intimately linked to the nature of the measurements in question: the Sagnac experiment detects the rotation of the revolving interferometer (relative to the "rest state"), whereas the MGP experiment, with its interferometer fixed to the local revolving frame, detected the rotation of the Earth. Because of the resolution limits, the Sagnac experiment could never have hoped to detect the rotation of the Earth, any more than the MM experiment could have detected the rotation of its own apparatus.[18] What the Sagnac experiment did, however, unequivocally demonstrate was that there was a precedent for the optical detection of rotary motion. But relativists, including Einstein, largely discarded this fact for nearly three decades. An open-loop Sagnac effect ($\delta t= 2A\ \omega/c^2$) is today well-established for the paths of electromagnetic signals around the planet: employing the GPS satellite relay system, delays have been measured by clocks on the order of fractions of microseconds in the E-W transmission with respect to the W-E transmission.[19]

### 4.3. The Sagnac Legacy: Dispute with General Relativity

Up until 1932, when Joos finally enunciated the Relativistic postulates regarding rotation and translation, the Sagnac experiment was deliberately ignored by physicists, save for a few adherents of the stationary aether theory. All the relativists who pondered over it dismissed the experiment by invoking the possibilities of systematic errors. Joos, who pointed out the error of these relativists, suggested that the Sagnac effect belonged to the same order of experiments as the MGP, to be treated by the complex solutions of GR. Whittaker, in his *History of the Theories of Aether and Electricity,* only mentions Sagnac once in a footnote. In fact, Sagnac's work is a conspicuous absence within physical theory. But maybe this is not so astonishing, as the experiment affords a measure of altered speeds of propagation which take no recourse to relativistic formulas.

No relativist today would dream of disputing the findings of the Sagnac experiment. Most transoceanic planes, nuclear

New Energy Times Archive

No relativist today would dream of disputing the findings of the Sagnac experiment. Most transoceanic planes, nuclear submarines, and communications satellites navigate today with laser ring gyroscopes that utilize the Sagnac effect for position location. The accuracy of the original Sagnac experiment has been estimated at 1:100, but a repetition of the Sagnac experiment with lasers, in 1963, by Macek and Davis, confirmed the result to $1:10^{12}$.

submarines, and communications satellites navigate today with laser ring gyroscopes that utilize the Sagnac effect for position location. The accuracy of the original Sagnac experiment has been estimated at 1:100, but a repetition of the Sagnac experiment with lasers, in 1963, by Macek and Davis, confirmed the result to $1:10^{12}$.[20]

Curiously, many relativists and experimentalists get caught in their ignorance of the Sagnac effect. In 1979, Brillet and Hall[21] reported a null result (absence of frequency shift) with frequency-locked laser beams, one set in a rotating interferometer, and the other kept stationary, and thus concluded in favor of the isotropy of space. However, not only did they observe a 50 Hz signal at precisely the rotation rate of the turntable employed, but also another more troublesome signal, at 17 Hz. Aspden, who has suggested that the null result may well be the inevitable consequence of such frequency-locked laser tests because "the frequency of the lasers will adjust to the reorientation of the apparatus exactly to cancel any effect due to motion through the light-reference frame,"[22] commented on the 17 Hz frequency shift findings of Brillet and Hall, which had been ignored by them as a "persistent spurious signal":

> Interpreting the 17 Hz signal as the second harmonic of table rotation found by Brillet and Hall in relation to the laser frequency $8.85*10^{13}$ Hz, we find the ratio $1.92*10^{-13}$ and, as this is 0.131 $(\upsilon/c)^2$, we find that $\upsilon/c$ is $1.21*10^{-6}$, giving v as 363 m/sec. If our theory is correct then, within the errors of measurement, this should be the west-east speed of Earth rotation at Boulder, Colorado. Being at 40°N, Boulder has, in fact, an Earth rotation speed of 355 m/sec.[23]

Apparently, Brillet and Hall were conducting a control on the MGP experiment using the Sagnac effect to detect the Earth's speed of rotation and with the required resolution, without knowing it!

More recently still, there have been confirmations of the Sagnac effect for electrons and neutrons. In 1993, Hasselbach and Nicklaus[24] reported a shift of 0.06 fringes using rotating electron beams. The result clearly indicates that atmospheric charges flow faster westward than in the opposite direction. Werner *et al.*[25] confirmed the Sagnac effect with neutron interferometry. With a swiveling apparatus, they showed that if the interferometer rotated in a N-S plane the effect was extinguished, whereas in a W-E plane it was at a maximum. Hence, the propagation of neutrons, apparently unaffected by magnetic and electric fields, is, like the propagation of light, affected by the west to east rotation of the Earth. Propagation of electromagnetic signals and neutrons is only invariant with respect to the inertial frame of the Earth's translation, not with respect to the Earth's revolving frame. Rauch[26] confirmed the neutron results and suggested a dual explanation for his experiments with a revolving interferometer rotating about an horizontal axis. He invoked both GR's model of differential gravitational potentials arising for the two beams, and the Sagnac effect for the "phase shift between two paths oriented in opposite directions about the Earth's axis of rotation," giving time-dilation a wide berth.

A confirmation of the MGP experiment has been recently carried out by Bilger *et al.* employing a ring He-Ne laser apparatus fixed to the surface of the Earth.[27] They demonstrated that the measurements obtained by the MGP experiment are due to the West-to-East direction of the rotary motion of the Earth. The tests were conducted at 43°29′ S latitude, in New Zealand, and the observed fringe shift was opposite in direction to that of tests carried out in the Northern hemisphere (in the Southern Hemisphere, clockwise rotation causes retardation when viewed from the South Pole, just as counterclockwise rotation causes retardation when viewed from the North Pole). With a resolution of $1:10^{20}$, the Bilger *et al.* result confirmed that electromagnetic signals propagate slower eastward than westward.

Many anti-relativists claim that neither SR nor GR can explain the Sagnac effect. But more to the point is the fact that the effect, concerning the motion of a non-inertial frame, does fall within the scope of GR, but that GR cannot adequately account for it. In fact, the results predicted from GR only account for an infinitesimal portion of the experimental results. Two relativistic effects are invoked by GR to explain the detectability of rotation of photons, electrons and neutrons, from a de Broglie/Bohm perspective. They are: 1) the variation in the gravitational potential of the beams subject to rotation, due to the West-to-East rotation of the Earth, and 2) the Sagnac effect, which is interpreted as a function of time dilation, and is assumed to be greater for a particle traveling against the rotation of the disc than for one traveling in the same direction; the result being that the particle in question will have traveled a greater distance in the same time interval (the direction of the observed shift being opposite to the direction of rotation of the platform).

Aspden once addressed the problem inherent to SR's first postulate as being due to a fundamental ambiguity in the determination of inertial frames:

> The problem is that our measurements require this inertial reference frame to be, in some cases, a frame located by the centre of the Earth and, in other cases in which the test apparatus is rotating, a frame referenced by the structure of the apparatus itself. The consequences of this are very perplexing and the Theory of Relativity does not provide an adequate answer because it gives no basis for distinguishing the inertial frame to be used when applying the Principle of Relativity. . . It is one thing to look to distant stars as mediating between matter on Earth to help account for inertial properties in a way linked with gravitation. It is quite another matter to expect dis-

New Energy Times Archive

tant stars to affect the speed of propagation of light between two points on the Earth's surface, especially if this speed changes with latitude.[28]

Relativists would certainly object that the invariance of c only applies to relative speed measured with respect to frames in uniform translation and hence, that it can vary with respect to revolving frames, as permitted by GR. But the problem is further highlighted by the Sagnac effect, which demonstrates that the propagation of two countermoving light disturbances can be retarded or advanced *by the direction of rotation of an apparatus, as seen from the apparatus' viewpoint,* as well as from the viewpoint of the observer who is stationary in the laboratory; or, for a fixed interferometer, *by the direction of rotation of the Earth.* The question therefore is really no longer whether the interferometer is fixed or rotating—given that, as Aspden argues, even a rotating interferometer can measure electromagnetically *not only its own rotation but also that of the revolving frame with respect to which its rotation axis is at rest,* and he has effectively confirmed this contention with his interpretation of the Brillet and Hall results by demonstrating that they did detect the rotational motion of the local Earth surface revolving frame, even if unbeknownst to them.

Recently, A.G. Kelly has claimed novelty for a "new theory of light," as he titled his proposal, succinctly described in these terms:

> Light generated upon the Earth, travels with the Earth on its orbit around the Sun, but does not adapt to the spin of the Earth upon its axis. Light is in a frame of reference with its origin at the center of the Earth. That center travels on its orbit around the Sun, but does not spin with the Earth.[18]

This is an obvious proposal which, for the sake of preserving the irrational mystique of higher relativistic mathematics, has long been ignored. However, it is not new. It essentially follows Sagnac's model, and other similar proposals have been suggested—most notably, by Aspden. What needs to be unequivocally explained is that Relativity (as SR) treated the observer, stationary in the laboratory frame, as being at rest in a non-revolving or inertial frame whose origin was located by the center of the Earth. It then proceeded to describe a plurality of such observers in identical inertial frames and asserted that, relative to any observer, the speed of light is constant. But in the process of generalizing the relative invariance of light to any and every observer, it now had to include an observer in a revolving frame; and here, Relativity (as GR) found itself having to admit that *the speed of light is no longer constant for any and every observer.* The rationale for this "adjustment" of the theory was ascribed to such factors as gravitational potentials, time dilation, and the dragging of inertial frames in rotation. In other words, when experimentally confronted with the electromagnetic detectability of rotation, be it the rotation of the Earth (the MGP experiment) or the interferometer (the Sagnac experiment), Relativity found it had to perform a theoretical volte-face, and to deny the very principle it claimed to have generalized! Yet, Relativity can neither account for the magnitude of the Sagnac effect, nor for the time delays in signal propagation around the globe.

The results of the Sagnac experiment, the MGP experiment, and the Brillet and Hall experiment all indicate that one can effectively measure rotation by optical means,

When experimentally confronted with the electromagnetic detectability of rotation, be it the rotation of the Earth (the MGP experiment) or the interferometer (the Sagnac experiment), Relativity found it had to perform a theoretical volte-face, and to deny the very principle it claimed to have generalized! Yet, Relativity can neither account for the magnitude of the Sagnac effect, nor for the time delays in signal propagation around the globe.

whether the interferometer is rotating or not. Given the required resolution, a rotating interferometer will always be capable of optically measuring its own rate of rotation, as well as that of the revolving frame on which its axis of rotation is inertially at rest. A stationary interferometer can only electromagnetically measure the rate of rotation of the revolving frame on which it is inertially at rest.

> *"There turned out to be a constant unexplained signal—a hiss, a hum—coming out of the receiver no matter how the antenna was positioned, even if it was pointed at empty space, no matter when the experiments were done."*
>
> D. Overbye, *Lonely Hearts of the Cosmos*, 1991, p. 133

## 5. The New Aether Drift

### 5.1. The Return of the Repressed: The Cosmic Microwave Background Radiation as a Space Frame of Electromagnetic Reference

If the negative results of the Michelson-Morley experiments ushered in the relativist age by failing to demonstrate any contribution on the part of the linear motion of the Earth to the local velocity of light, the discovery in 1965 by A. Penzias and R. Wilson, at Bell Telephone Laboratories, of the 2.73 Kelvin cosmic background radiation (CBR), in the form of a bothersome hiss that would not go away, marks the rebirth of the notions of absolute motion and the "new aether drift" (Peebles' expression[29]).

The Penzias and Wilson discovery presented an isomorphic (to 1 part in 1,000) microwave radiation field, detected at wavelengths of mm to cm. This discovery was immediately hailed by R. Dicke as proof of G. Gamow's 1949 prediction of an isotropic electromagnetic radiation indicative of the Big Bang event. From then on, the CBR was consistently interpreted as the fossil remains of a very hot phase of the universe. The isotropic distribution of the flux was assumed to be due to the cooling, through expansion, of the 4,000K fossil radiation emitted when primordial hydrogen ceased being ionized.

What was essential for the "Princeton gnostics" was the presence of microwave radiation at a wavelength of 7.35 cm (at 4 GHz), because this was seen by them as the physical marker for the beginning of the universe, the primordial explosion (theory of sudden creation), and provided the necessary evidence to discredit the competing astrophysical theory of a



New Energy Times Archive

The scientific mania of finding an origin to Time and Space here reached its pinnacle of devotion with what is tantamount to an article of faith: the CBR is taken as "proof" of the smooth evolution of the present expansion-phase of the universe, another credo fused to relativity theory following Hubble's "discovery" that "all" galaxies "are" moving away from our own. So, even if strictly speaking the notion that the CBR is a fossil of time does not require Relativity, it soon became a cornerstone of relativistic astrophysics.

continuous creation of matter required to "fill" the increasing space between atoms in an expanding universe. In accordance with the relativistic Big Bang hypothesis, space is uniformly occupied, as the originary explosion is not an explosion of matter in space, but an explosion of space itself.[30] Hence the importance of the observed isotropy indicating absence of structure at various angular scales, and suggesting that the CBR has the spectral characteristics of a black body.

The scientific mania of finding an origin to Time and Space here reached its pinnacle of devotion with what is tantamount to an article of faith: the CBR is taken as "proof" of the smooth evolution of the present expansion-phase of the universe, another credo fused to relativity theory following Hubble's "discovery" that "all" galaxies "are" moving away from our own. So, even if strictly speaking the notion that the CBR is a fossil of time does not require Relativity, it soon became a cornerstone of relativistic astrophysics.

Subsequent experimentation by independent groups has extended the range of measurements up to 400 GHz and, within that range, the relative intensity of the radiation increases proportional to frequency. Extrapolations for a decrease in relative intensity with frequencies above 400 GHz, are solely the result of relativistic computations.

### 5.2. The Anisotropy of the Cosmic Blackbody Radiation

This perfect picture of cosmic isotropy was disrupted, soon enough, by the demonstration that the temperature of the cosmic microwave radiation is not, in fact, precisely the same in all directions.[31] Two Dicke radiometers, working at a frequency of 33 GHz ($\lambda$ = 0.9 cm, a wavelength at which the galactic background microwave radiation is low), carried aboard the NASA-Ames Earth Survey U-2 aircraft, detected a cosine anisotropy (a cosine dependence on the angle between the direction of the peak and the direction of the observation) on the order of <1 part in 3,000. In the context of General Relativity, this anisotropy was readily interpreted as due to the motion of the Earth (more precisely, the motion of the Solar System) relative to the rest frame of the cosmic background radiation, in the direction where radiation is the most intense. Assuming this peculiar motion of the Earth, the CBR is slightly "bluer" (hotter) in the direction of the motion, and slightly "redder" (cooler) in the opposite direction. So, the findings were seen as confirmation that GR is correct about the expansion of the universe. This, in turn, led to the conclusion that the CBR constitutes the cosmic background of energy in a frame of reference that is moving at 99.9% the speed of light with respect to the matter of the Big Bang.

This discovery of the "new electromagnetic aether drift" effectively resurrected the notion of an electromagnetic frame of reference fixed in space, even if it be defined as the expanding coordinate system in which the galaxies are nearly at rest. The peculiar velocities of galaxies and other astrophysical bodies are determined with respect to this CBR frame. Using $T_0 = 2.7$ K as the average temperature of the cosmic blackbody radiation, and the maximum temperature difference of $T_1 = 0.0035$ K, Smoot *et al.* calculated that, taking into account the Doppler shift, the Earth is moving at a velocity of

$$v_{SSpec} = (T_1/T_0)\, c = 388.6 \pm 60 \text{ km/s}$$

in the direction of galactic co-ordinates 54°±10° lat. N, 245°±15° long., towards Regulus, the brightest star of the Leo constellation.[32] A previous, lower-resolution determination by Corey and Wilkinson had given 270±70 km/sec.[31]

The reader should note that this is not the velocity expected to arise from the Solar System's translation around the galactic center, but the integral value of the translational velocity of the Solar System in space, just as if we were measuring the absolute speed of motion of the Earth in space! If we knew exactly the velocity of the Solar System due to rotation of the galaxy, we could in principle determine the peculiar velocity of the galaxy with respect to the CBR. Assuming the 1977 result of Visvathan and Sandage for a galactic translational speed of the Solar System on the order of 300±50 km/sec, in the direction of galactic coordinates 0° lat., 90° long., the peculiar velocity of the Milky Way was approximated by Smoot *et al.* as 603 km/sec (10.4 R.A., -18° dec, or 261° gal. long., 33° gal. lat.) "with respect to the cosmic background radiation."[32]

As Rowan-Robinson sagaciously commented, this finding presents all sorts of problems:

> What are we to make of this? The authors note that the velocity they have found conflicts with various attempts to measure our velocity with respect to nearby galaxies but offer no explanation of this. With respect to the Local Group [the group of galaxies to which the Milky Way belongs], the motion of the Solar System hardly differs from that expected due to our circular motion around the galaxy. This suggests that the whole Local Group has to be moving along together at this velocity of 600 km/sec with respect to the microwave background. And this velocity is more than ten times the residual random motion of galaxies within 20 Mpc [$6.17*10^{23}$ m or 65.2 Mly] about the Hubble flow, so that most nearby galaxies, including the Virgo cluster of galaxies, would have to move along together at this velocity. The universe may be much more inhomogeneous than we realized till now, and we may have to be careful about interpreting the expansion timescale we measure locally as the age of the universe.[33]

These wise words put in perspective all the interpretative steps involved in current cosmology. The Smoot *et al.* results conflict with the magnitude of the measurements of the peculiar velocity of the Earth or Solar System with respect to nearby galaxies, as well as with the celestial or galactic coordinates of the motion.[34-35] The direction of the net galac-



New Energy Times Archive

tic motion of the Earth and Sun obtained by Smoot *et al.*[32] is almost at right angles to the results of Rubin *et al.*[35] Moreover, the velocity of the Local Group with respect to nearby galaxies suggests that there is considerable turbulence in the universe, a result which is difficult to reconcile with the isotropic character of the CBR, and which led to Hawking's proposal that the universe itself (the structure of Space-Time) may be spinning.

Whether the CBR is an expanding or a fixed system of coordinates, *i.e.* whether or not it is the residue of the Big Bang, it now figures within GR as a preferred frame of reference for electromagnetic radiation and motion! It would seem therefore that absolute motion in space can be measured after all with respect to the cosmic microwave background radiation, as a function of measured anisotropy. With respect to the CBR frame the propagation of light remains essentially isotropic and invariant. A universal frame of reference had been found, yet Relativity postulates that all co-ordinate systems are interchangeable (the universality of Relativity). This is another clear testimony to the saying that nothing dies of contradiction.

### 5.3. On the Eve of an Epistemological Upset

The worst enemy of any advancement in our comprehension of nature is not the magnitude of the unknown, but the prevalent belief that there is very little remaining to be known. Not only because this fosters a complacent attitude, foreign to the true scientific spirit, but above all because, instead of supporting *basic* investigation of that unknown, it increasingly denies such support by invoking *a priori* limitations derived from inadequate mathematical theories. The stationary aether fixed to absolute space was one such limiting notion, and yet it was overcome by another notion (Relativity) which was no less limiting. Even if Relativity could account for the MGP experiment, it was never able to deal adequately with the Sagnac effect, limiting itself to adding a superfluous time dilation that has the sole effect of needlessly complexifying the relations at stake. If it were not for the security afforded by accepted paradigms, and if scientists were to apply Ockam's razor rather than merely providing it lip service, Relativity would not have much to stand upon when confronted with the Sagnac effect, which should have made Mach swallow his words with respect to the relativism of rotary motion. With the Sagnac effect, not only the rotation of the interferometer but also that of the Earth could be determined by optical and electromagnetic means. This should have more than sufficed to put Relativity on the spot. But official science, having incorporated Relativity, was able to gloss over this challenge. Over a century after Mach's words, we can state firmly that rotation is an absolute state of motion, and not even the most rabid relativist can avoid this realization. To put it bluntly, Mach was wrong.

The worst enemy of any advancement in our comprehension of nature is not the magnitude of the unknown, but the prevalent belief that there is very little remaining to be known. Not only because this fosters a complacent attitude, foreign to the true scientific spirit, but above all because, instead of supporting *basic* investigation of that unknown, it increasingly denies such support by invoking *a priori* limitations derived from inadequate mathematical theories.

It was Michelson's 1881 mistake which appeared to reduce the question of the existence of the aether to whether the orbital motion of the Earth could be detected by electromagnetic means. Equated in these terms, which no longer obeyed Fresnel's law, the null result was taken to be the death of the concept of the aether. Yet, even Einstein would argue that the only aether which had died was the stationary one. But his gravitational aether fared no better than the stationary aether, when he and other mechanistic-minded physicists sought instead to establish the geometric primacy of a Spacetime devoid of energetic considerations, a pure mathematical abstraction without actual physical qualities, and employing imaginary time.

For adherents of both the stationary aether and Relativity, the MM experiment has been taken to mean that light adapts to the translatory frame of the Earth's motion around the Sun. Relativists express this relation by saying that light is referenced to the inertial frame of the Earth in a substantial condition of translation. By the same token, the proposal has been made that the Sagnac experiment demonstrates that light does not adapt to revolving frames, such as the Earth's revolving frame; a proposal which relativists express as non-adaptation to non-inertial frames. In fact, all one was entitled to conclude at the time, at this conjuncture, was that the MM experiment showed that none of the translatory components of the inertial motion of the Earth were detected optically—something which was later confirmed by frequency-locked laser experiments: neither the orbital translation of the Earth around the Sun, nor the galactic translation of the Earth and the Solar System around the galactic center, nor any absolute or peculiar velocity of the Earth or Solar System were in fact detectable.

Still, all this would be fine and dandy if Relativity did not insist on its pretentious claim of being able to measure the "peculiar" velocities of astrophysical bodies by interpreting any displacement of electromagnetic radiation with reference to a general body of galaxies and, more recently, with reference to a cosmic microwave background radiation that appears to be slightly anisotropic because of our peculiar motion. By resurrecting the question of absolute motion as the measurement of peculiar velocity with respect to the CBR, the entire aethereal can of worms has been reopened.

Here is reason to examine exactly *what* it is that produces the invariant effect of propagation of c, the phenomenon discovered accidentally by the MM experiment. In other words, there is very good reason to question—in just which frame of reference is the light speed constant? Is it in the translational frame of the Earth's solar orbital? In the translational frame of the galactic orbital? In Aspden's words: "Of crucial importance is whether this background space lattice is locked to and referenced on mother Earth for some distance above the Earth's surface, or whether it has some connection with the Sun, or whether it is set in some absolute or cosmic frame of reference."[36]

New Energy Times Archive

From the tortuous course of null and positive results, we can at present conclude:

- Space no longer appears to be empty, as it once did for Special and even General Relativity. An absolute vacuum of matter and energy is unattainable and not a real physical possibility that should or need be considered. The "vacuum state" is a misnomer, for the "vacuum" is filled with energy. The concept of empty space, a tributary to Democritus' idea of a void between the atoms, is no more pertinent and apt a description of physical reality than was the static aether image of the nineteenth century, when the Michelson-Morley experiments dethroned it.

- The perfect symmetry of Spacetime does not describe physical reality, only an ideal reality that is imaginarily perfect. There is no intrinsic or heuristic requirement on the part of the Sagnac effect or the Silvertooth experiment for any time-dilation transformations. The very notion of spatialized Time is most doubtful, if not a prejudice that prevents enunciation of a Physics of Simultaneity.

- With respect to the CBR frame, the propagation of light remains essentially isotropic and invariant. A cosmic universal frame of reference for the propagation of electromagnetic energy has been found—in direct contravention of Special Relativity—but this discovery has been co-opted by the Big Bang ideologists.

- States of rotation of material bodies can be determined optically and electromagnetically. Mach was wrong.

Einstein once hoped that Relativity would become the strict relationist theory Mach had called for. Einstein's response to Mach's difficulties was to treat inertial effects not as a function of some absolute acceleration, but rather as the result of the gravitational interaction of the test system with the rest of the mass of the universe, as expressed by a synthesis of mechanical and geometric factors. Einstein could not hope to satisfy Mach's postulate of an *absolute identity* of the Spacetime continuum with the set of spatiotemporal relations between material bodies. We know today that reference to the detectable mass of the universe does not serve to explain the electromagnetically measured peculiar velocity of galaxies, stars, and their systems. To a certain extent, GR guarded itself against this shortcoming of Mach's theory by adding geometric constraints to the inertia of systems in motion—and later, to patch the hole, the notion of dark matter was added. Einstein was in fact obliged to treat the continuum as a pseudo-Riemannian manifold that had a *separate physical reality distinct* from the spatiotemporal relations between material objects. The manifold is presented as being affected by the distribution of mass within it, and as affecting the motion of this mass. This clearly introduces substantivalist considerations into what was originally deemed to be a relationist project. These substantivalist considerations are essentially embodied by:

1. The adoption of both mechanical and merely axiomatic constraints in the definition of the metric structure of Spacetime.

2. The persistence in treating Time as equivalent to a timeline (first reduction) that can be reduced to an extension length (second reduction), in turn treated as a relative interval (third reduction) of a pseudo-Riemannian manifold.

3. The arbitrary imposition of an electromagnetic invariant absolute speed on the radiative description of gravitational fields.

4. Most importantly, the reduction of gravitational energy to the metric structure of Spacetime.

The Spacetime of SR was a flat Minkowski manifold. In GR, the manifold becomes instead curved, or a Gaussian spheroid surface, precisely to indicate the manifestation of gravitational fields in the form of a deviation of the geodesic lines from the coordinate axes of any chosen inertial frame of reference. But thereby, for as long as the Weyl tensor (or conformal curvature tensor) is held to remain unchanged—as a minimum curvature of the Spacetime continuum—a claim can be made that the theory holds Spacetime to be independent from the energy-stress tensor, and thus independent from both energy and mass. Spacetime does not exist simply as a set of relations between material bodies. It is "affected" by the distribution of both matter and electromagnetic fields, and in turn it "affects" the combinations of mass (or energy, in relativistic language) and linear momentum. Moreover, it also has some degree of existence as a set of relations that is independent of the terms, independent from the actual distribution of matter in the universe, and serves as milieu for those relations. A return to the philosophy of empiricism may seem inevitable, but it occurs in the strange form of a geometrical "supersubstantivalist program": if relations exist outside of the terms, one may hold that the continuum of Spacetime exists as a structure of the overall set of relations that not only has a being of its own, but also underlies the being and the structure of matter and its relations, "thus identifying all material objects with Spacetime itself," to paraphrase Sklar. Since the curvature of the continuum is the very condition of its volumetric existence (thus "there are true gravitational fields even in empty space"), and since curved Spacetime is identical with the physical notion of a "true gravitational field," such an approach is tantamount to making the existence of Space everywhere dependent upon gravitational fields. This alone precludes the existence anywhere in the cosmos of a true inertial frame, even of one that could be asymptotically construed in regions very distant from any gravitating masses. One might suggest, as others have for three decades, that it is the Spacetime envelope which is engaged in absolute rotation, and that this justifies both the notion that the Weyl tensor remains unchanged and that Space itself should depend upon "true gravitational fields." One wonders why GR never deployed the notion that the Spacetime continuum itself develops a minimum gravitational field embodied by the Weyl tensor, when the Ricci-Einstein (or energy-stress) tensor vanishes. Maybe it was feared that any move in this direction might, after all, lead the theory back to the notion of a single Time; or maybe it was sensed that it would lead to a still more embarrassing difficulty—having to explain how the volume of Space would have had to arise from geometric considerations that depended upon a gravitational field being deployed in the absence of mass.

Curiously enough, the notion that the Space and Time con-



New Energy Times Archive

Energy may, can, and does exist in massless forms devoid of inertial effects. Moreover, if one succeeds in tying together the structure of the continuum (the properties of Space and Time) with the properties of an energy flux, then what is pertinent to ask is instead: how do gravitational fields arise—together with the matter that they assign—from precisely the massless flux of the continuum? Then, a single and universal Time may yet turn out to be but the property of the rotation of the entire continuum of Space and Time.

tinuum exists independently from material bodies and even from their relations, and that it at once encompasses the entire set of these relations plus the intrinsic energy structure of all material bodies, is not necessarily a geometric or a metaphysical proposition. However, in order to avoid the traps of either position, one must understand the continuum not as a set of points, not as a topological abstraction, but as energy in flux, as a continuum of superimposed lines or wavefunctions, which are not to be defined by any succession of points, no matter how close one places them. Waves do not undulate in flat or curved Spacetimes. And they do not exist independently from energy, either. If there is any deep meaning to the first law of conservation of energy, it is that Space and Time are conserved and thus infinite as such, and this is not to the detriment of Space being finite at any instant of Time. In order to assemble the functions of an energy continuum productive of Space and of Time, one requires entirely different concepts than those of GR. A fundamental contamination has taken place. What are in fact two distinct manifolds were abusively fused into one, instead of being recognized for what they are, property sets of both number and *qualia* that belong to a single continuum. And the volumetric existence of Spacetime was made to depend upon a gravitational field devoid of matter and also of energy. . . Herein lies the rub: if Spacetime depends upon gravitational fields, patchy or not, these fields are conceptualized as void of energy because they are void of mass (on the very abusive basis that all energy has mass). Yet, there is no reason to be lost in this way. Energy may, can, and does exist in massless forms devoid of inertial effects. Moreover, if one succeeds in tying together the structure of the continuum (the properties of Space and Time) with the properties of an energy flux, then what is pertinent to ask is instead: how do gravitational fields arise—together with the matter that they assign—from precisely the massless flux of the continuum? Then, a single and universal Time may yet turn out to be but the property of the rotation of the entire continuum of Space and Time.

**Acknowledgements**

The authors wish to thank Dr. M. Askanas for help in editing the manuscript, incisive review, and excellent debate.

**References**

1. Michelson, A.A. 1925. *The University Record,* 11:153, University of Chicago.
2. Einstein, A. 1920. "Ether and Relativity," in *Sidelights on Relativity*, Methuen & Co., London, UK, 1922.
3. Reichenbach, H. 1942. *From Copernicus to Einstein,* Alliance Book Corp., New York, pp. 85-86.
4. FitzGerald, G.F. 1902. *The Scientific Writings of the Late G.F. FitzGerald,* Dublin, Hodges, Figgis & Co., London, England, p. 313.
5. Whittaker, E. 1953. *A History of the Theories of Aether and Electricity,* Vol. 2, Dover Publications, New York, p. 158.
6. Einstein, A. 1955. *The Meaning of Relativity,* Princeton University Press, Princeton, New Jersey, p. 61.
7. Joos, G. 1934. *Theoretical Physics*, Hafner, New York, p. 449.
8. Will, C. 1986. *Was Einstein Right?* Basic Books Publishers, New York, p. 219.
9. Whittaker, *op. cit.*, Vol. 2, p. 159.
10. Will, *op. cit.*, p. 217.
11. Whitehead, A.N. 1953. *An Anthology,* Cambridge University Press, p. 356.
12. Einstein, "Ether and Relativity," *op. cit.*, p. 18.
13. *Ibid.*, p. 33.
14. *Ibid.*, p. 19.
15. *Ibid.*, p. 21.
16. Sagnac, M.G. 1913. *Comptes Rendus,* 157:710 (October 27). Our translation.
17. Sagnac, M.G. 1913. *Comptes Rendus* 157:1413 (December 22). Our translation.
18. In a recent communication, A.G. Kelly has calculated the fringe shift due to the rotation of the Earth in a Sagnac interferometer of 1m diameter to be "$4*10^{-11}$ fringes at mid-latitudes," and thus indiscernible; Kelly, A.G. 1996. The Institution of Engineers of Ireland, Monograph 2, February. The paper has been posted on the internet, at http://www.failte.com/iei/paper.htm.
19. Allan, D.W. *et al.* 1985. *Science,* 228:69.
20. Macek, W.M. and Davis, D.T. 1963. *Appl. Phys. Lett.*, 3:67.
21. Brillet, A. and Hall, J.L. 1979. *Phys. Rev. Lett.*, 42:549.
22. Aspden, H. 1980. *Physics Unified,* Sabberton Publications, Southampton, England, p. 59.
23. Aspden, H. 1981. *Phys. Lett.*, 85A:411.
24. Hasselbach, N. 1993. *Phys. Rev. A,* 48:143.
25. Werner *et al.* 1979. *Phys. Rev. Lett.*, 42:1103.
26. Rauch, H. 1993. *Science,* 262:1384.
27. Bilger, H.R. *et al.* 1995. *IEEE Trans.*, Instrum & Measurem, Vol. 44, 2:468.
28. Aspden, H. *Physics Unified, op. cit.*, pp. 51-52 and 54.
29. Peebles, P.J. 1971. *Physical Cosmology*, Princeton University Press, New Jersey.
30. Muller, R.A. 1978. *Scientific American,* May:64.
31. Corey, B.E. and Wilkinson, D.T. 1976. *Bull. Amer. Astron. Astrophys. Soc.*, 8:351.
32. Smoot, G.F. *et al.* 1977. *Phys. Rev. Lett.*, 398:898.
33. Rowan-Robinson, M. 1977. *Nature,* 270:9.
34. DeVaucouleurs, G. and Peters, W.L. 1968. *Nature,* 220:868.
35. Rubin, V.G. *et al.* 1976. *Astron. J.*, 81:687.
36. Aspden, H. 1990. *Phys. Essays,* 3:39.

* Concord, Ontario, Canada, L4K 2J6; See the complete author biographies in *IE* No. 37.

© 2001 Correa & Correa—All rights reserved.

New Energy Times Archive

# New Energy Research Laboratory ✧✧✧ Device and Process Testing Update

Ken Rauen

## Warlock's Wheel

Former NERL physicist Jeff Kooistra developed an unusual electric motor, a derivative of one originally conceived by the late Stefan Marinov. The Marinov Motor concept was modified and demonstrated through the efforts of Kooistra, Tom Ligon, and Tom Phipps; this design was called the KLP Motor. (See *IE* Issues No. 17, pp. 40-48; No. 18, p. 7; No. 19, pp. 57-71, 85; No. 20, pp. 7-8.) The KLP took the magnetic torus-shaped rotor of the Marinov design and made it of two stacks of opposing polarity magnets with leakage flux allowed. It also improved the electrically conducting ring around the magnetic torus by making it a multi-turn coil.

Jeff made a discovery while investigating the ability of the earlier, solid copper ring to rotate while the permanent magnet structure was fixed in position, another permutation of the Marinov/KLP concept. When the DC current was applied to the ring, the direction of rotation of the ring could be reversed if the electrical brush contacts were made at the inside diameter of the flat, washer-like shaped ring instead of at the obvious outside diameter. This reversal made the ring rotate in the same direction as the magnetic structure would rotate if it were allowed to rotate. Jeff did another experiment to see what would happen if both structures were allowed to rotate. He found that both the ring and the magnets rotated in the same direction. This was an astonishing result, so he called it the "Warlock's Wheel."

NERL recently completed the construction of a prototype KLP Motor. Retired engineer Jan Roos took Jeff's prototype that had been made within a styrofoam coffee cup as its frame (the "cup motor," as we called it), which exhibited prograde, same-direction rotation of the stator when the entire motor was suspended from a nylon monofilament from the ceiling. Jan transferred as much as he could of Jeff's coffee cup design to a better-built prototype. Contrary to classical physics, the cup motor seemed to be exhibiting an apparent violation of Newton's Third Law of Motion—for every action there is an equal and opposite reaction. When Jeff's motor would work at all, as its construction was very crude, its "stator" and attached batteries would rotate in the same direction as the rotor, prograde motion, an unheard-of behavior for a motor. One of the times during which it did function, it was recorded on video tape running prograde and then some retrograde, but clearly not the decided retrograde direction normally expected. In comparison, a standard, miniature DC motor with a flywheel load attached to its shaft exhibits its stator and batteries spinning in the opposite, retrograde direction from the rotor and flywheel, in conformance with Newton's Third Law. Naturally, we wanted to clearly and unambiguously demonstrate the KLP Motor's ability to violate this Law, if possible. Jan's prototype showed retrograde motion of the case upon acceleration, but settled down to no motion of the stator when the stator was held in a jeweled bearing frame which allowed the stator to rotate also. We did not see prograde motion of the case to any extent, though some was seen. Prograde motion is definitely seen when the motor decelerates. A conventional motor was built with the same construction technique to see if the torque necessary to keep the internal rotor spinning under steady speed conditions was less than the stator housing bearings' friction. The conventional motor had the same behavior: it would exhibit retrograde stator torque upon startup and then settle down at the same, steady speed to a torque which is less than the friction of the bearing supporting the rotatable stator in the frame. See Photo 1. A gyroscope often spins without its housing spinning at all, so a lack of stator rotation is not a sign of a violation of Newton's Third Law.

Out of the disappointments of Jan's prototype, we wondered if the behavior of the KLP Motor and the Warlock's Wheel were conventional after all.

I had not studied the motor in depth when Jeff was here. So, I chose to do an analysis of the forces involved myself, using nothing more than the F = IxB law, and the axiom that parallel flux lines repel and antiparallel lines attract. I found that the Warlock's Wheel behavior can be entirely explained by these means. Leakage flux of the unusual magnetic stack is the active magnetic flux. Jeff also identified a "Lorentzian hook" in the rotating ring, and I found this piece of evidence to be key. When current is introduced to a conductive ring with a substantial change in radius, that radial current flow in the ring near the contact point, in the presence of the

**Photo 1:** The KLP motor stator and internal rotor are on the left. The stator contains the 300 turns of 34 gauge magnet wire coils, bundled with rubber bands, and two batteries with switching circuitry, as the KLP motor is an opto-electronically commutated DC motor. Inside the stator housing and on top is the rotor, containing two rectangular magnet stacks; one stack has a black tape marker on it. The body pieces of both motors are made of polycarbonate. The conventional motor is on the right, made from a 12VDC fan; the fan blades were cut off and the rotor with the magnets was glued on. The conventional motor is inside the frame and inside the rotatable stator outer jacket, used to hold the stator and to reduce windage. Its rotor is nearly the same mass and moment of inertia, and was operated at the same speed as the KLP rotor, when this latter and its stator assembly were inside the rotatable stator outer jacket.

New Energy Times Archive

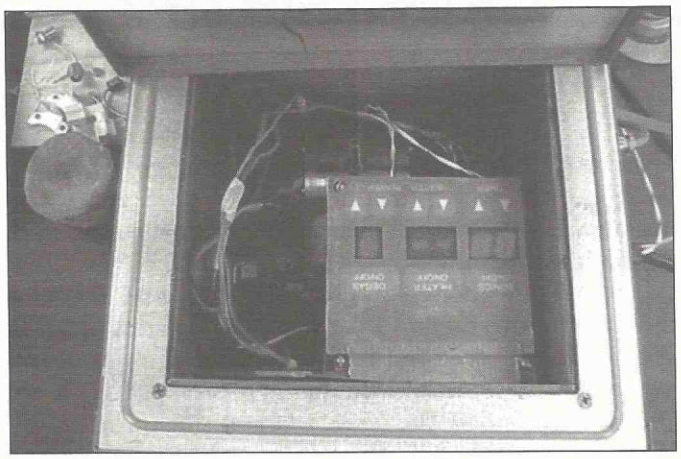


**Photo 2:** View inside the calorimeter with the new sonofusion reactor and its oscillator electronics. The argon pressure line is not attached and the reactor fill tube is open.

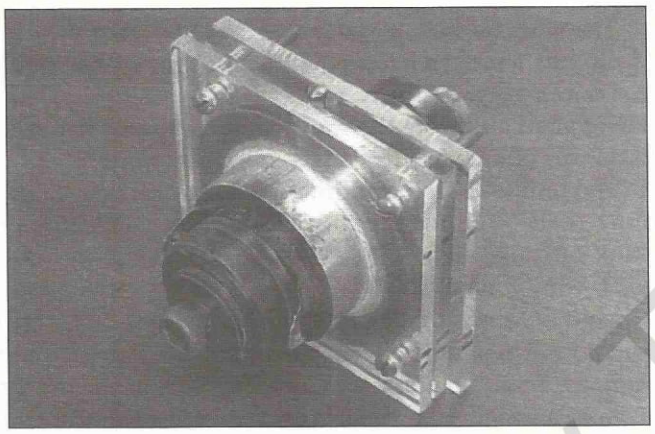


**Photo 3:** The original sonofusion piezoelectric assemblies mounted in a reactor made of three acrylic plates.

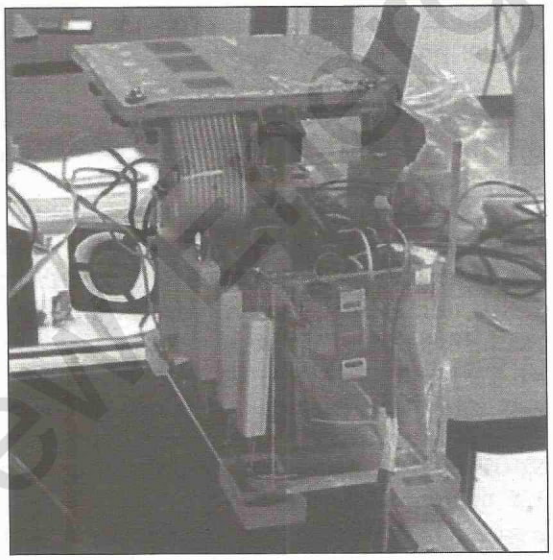


**Photo 4.** The Crest oscillator resting on the rim of the calorimeter. The joule heater bank and the circulation fan are visible.

magnetic field of the KLP magnet structure, exhibits a standard IxB force which causes rotation of the ring. Jeff's big question was how could this rotation exist simultaneously with a force which causes the magnetic structure to rotate in the same direction? The answer is that the stationary current leads which touch the conductive ring via brushes or pools of mercury feel the countertorque of classical electricity and magnetism. The forward torque was magnetically imparted to the magnetic structure from the current in the hand-held leads, which then imparted torque to the ring. The motion of the ring and magnets in the same direction hides the fact that there are opposed forces between the magnets and the ring, and at this point, we have no reason to believe that they are not equal forces. The hand-held leads react against the leakage flux of the magnets, then the leakage flux of the magnets reacts against the force created in the current in the ring. This analysis may not be correct, but, by Ocham's Razor that the simplest explanation is often the best explanation, it fits.

And so goes research. In order for new discoveries to be made, mistakes are often made along with them. The KLP Motor started as exploration for its own sake, even before Jeff came to NERL. The Marinov Motor and its KLP descendent do not exhibit anomalous motor behavior as far as we know. The motor is novel, in the sense that conventional motor analysis says it would not work. We will not pursue these concepts any more since they appear to offer no alternative to the world's present energy sources and do not substantially change the physics by which we search for new forms of useful energy.

### Sonofusion

The calorimetry provided by Roger Stringham (see Issues No. 35 and 36) was totally replaced by one Seebeck envelope calorimeter (SEC). The old calorimetry was too inaccurate to resolve the excess heat with confidence. Roger's original reactor completely filled the SEC, so to fit the oscillator electronics inside the SEC, we redesigned the reactor to be much smaller. See Photo 2.

When the new reactor was tested, calibration was much better, but excess heat in the experiment was not found again. Numerous changes may be responsible for the "turn off" and they are still being investigated. The resonant frequency of the piezo and reactor combination has changed. The Crest 275D oscillator operates around 38 to 39 kHz, presumably the resonance of the original reactor provided by Roger. We did not test it, and the original reactor is now in pieces. The new reactor was found to be 46.3 kHz when filled with heavy water. A mechanical stop inside the reactor for positioning the piezo transducer assemblies was removed. That stop was where the titanium "radiating bars" rested, assumed to be raising the frequency by increased mechanical stiffness. Since the oscillator was drawing 50 to 70 watts instead of 20 to 30 watts as before, and the reactor was heating to 100°C without a heater, it is believed that the stop was also conducting vibrational energy away from the water in addition to detuning the reactor, which caused it to draw more power. The removal of the stop decreased the resonant frequency to 45.7 kHz, still far from the

**Device and Testing continued on page 69**



New Energy Times Archive

# Thar She Blows

**A wind energy boom promises to confer wealth on those whom it has eluded for so long—North America's small farmers and native tribes.**

**Bennett Daviss**

Charles Goodman is sitting atop an energy bonanza longer-lived and ultimately richer than Saudi Arabia's. The energy is pollution-free, less than half the cost of solar power, poised to edge out natural gas in head-to-head price competition, and inexhaustible.

Goodman farms 100 acres of seed corn and soybeans outside of Alta, Iowa.

In a typical year, he'll make $100 to $200 from every acre except one—the acre where three wind turbines stand, just 600 feet from his porch. The energy developer that put up the turbines has guaranteed Goodman a minimum $750 annual royalty from each turbine on the electricity that winds blowing across Goodman's land generates. He can even farm right up to the 40-foot-square base of each tower, which takes a little more than 10% of the acre out of production. Last year, his one-acre wind farm earned him more than $6,000.

Wind may be the last untapped resource of the North American heartland. The buffalo are few and fenced, the topsoil has been tilled, the oil is long gone, and the water rights have been sold. But the wind that sweeps from the Rockies to the Appalachians renews itself hour by hour. No one owns it and no one can deplete it.

That endless, unclaimed resource has sparked a new kind of land rush. A California-based division of Enron, the natural gas giant, is leasing land and building wind farms from Washington state through the American south. Renewable Energy Systems, based in Austin, is starting to spin turbines across Texas. FPL Energy, a spinoff of Florida Power and Light, has entered the market along with dozens of smaller entrepreneurs whose turbines churn out electricity for power-hungry utilities in a market clamoring for clean energy.

But the opportunity is particularly rich for Goodman and his neighbors. Goodman's land sits at the southeastern end of Buffalo Ridge, a welt of glacial rubble running more than 65 miles from northwestern Iowa up across the corner of Minnesota to the South Dakota border. The ridge, rising as high as 1,900 feet above the surrounding plains, is not only the second-highest point in Minnesota, it's also just about the only geologic feature that rises into the winds blowing from Canada and the central Rocky Mountains on their way to Chicago. According to estimates based on U.S. Department of Energy figures, the winds in Wyoming, the Dakotas, Iowa, and Minnesota could generate enough electricity, using existing technology, to supply today's entire U.S. demand. North Dakota's breezes alone could feed 36% of the nation's appetite.

Topography funnels a good share of that potential through the area around Lake Benton, Minnesota, a town that sits at the other end of Buffalo Ridge from Alta. This hamlet of 703, located in the state's poorest county, is the hub of what is now the world's largest single wind farm. "I'd guess that the wind blows here 325 days out of every 365," says mayor Marlin Thompson, "and the average wind speed has been measured at 18 miles an hour. Everyone complained about the dust and the blizzards—until wind power came along."

The gusts became fair winds in 1994. In that year, the Minnesota legislature passed a law entitling Excel Energy, the state's biggest utility monopoly, to build a nuclear power plant and store the waste on its property. In return, Excel was obliged to invest in renewable energy.

The result: 281 wind turbines at last count, spread over more than 50 farms around Lake Benton. The turbines crank out just under 300 megawatts of electricity—on a good windy day, about enough to meet the average demand of Minneapolis and St. Paul—at a cost of 3.2 cents per kilowatt hour. "That's right about what electricity costs from gas-fired generating plants," says local farmer Jim Nichols, a former state senator and twice Minnesota's commissioner of agriculture. "The next generation of turbines will bring that down to around 2.8 cents, making wind power the cheapest electricity you can generate."

Farmers earn an average royalty of 2 to 4%, which fetches them about $1,500 to $2,000 a year from each turbine. The project plan calls for about another 100 turbines, and several smaller projects have sprung up locally to cash in on state tax incentives offered to investors in wind power projects of fewer than 2 megawatts.

One of the chief beneficiaries of the windfall (other than the farmer who has 17 turbines on a half-section of land) has been Lake Benton itself. The project brought 150 construction jobs to the area and 26 openings for permanent, high-skilled technical workers to repair and maintain the turbines. The city has completed a $2.5-million street improvement project, the county has added $715,000 in property taxes to support its schools (nearly a 50% increase), and the region has undergone an ancillary economic boomlet: tourism.

"We had eight or ten tour buses coming here every year to see the plays put on in Lake Benton's historic opera house," Thompson says. "Last year, we had more than 40 busloads, most of them to see the wind farm." Downtown, Lake Benton has built a 5,670-square-foot "Heritage Wind Power Learning Center of Southwest Minnesota," complete



New Energy Times Archive

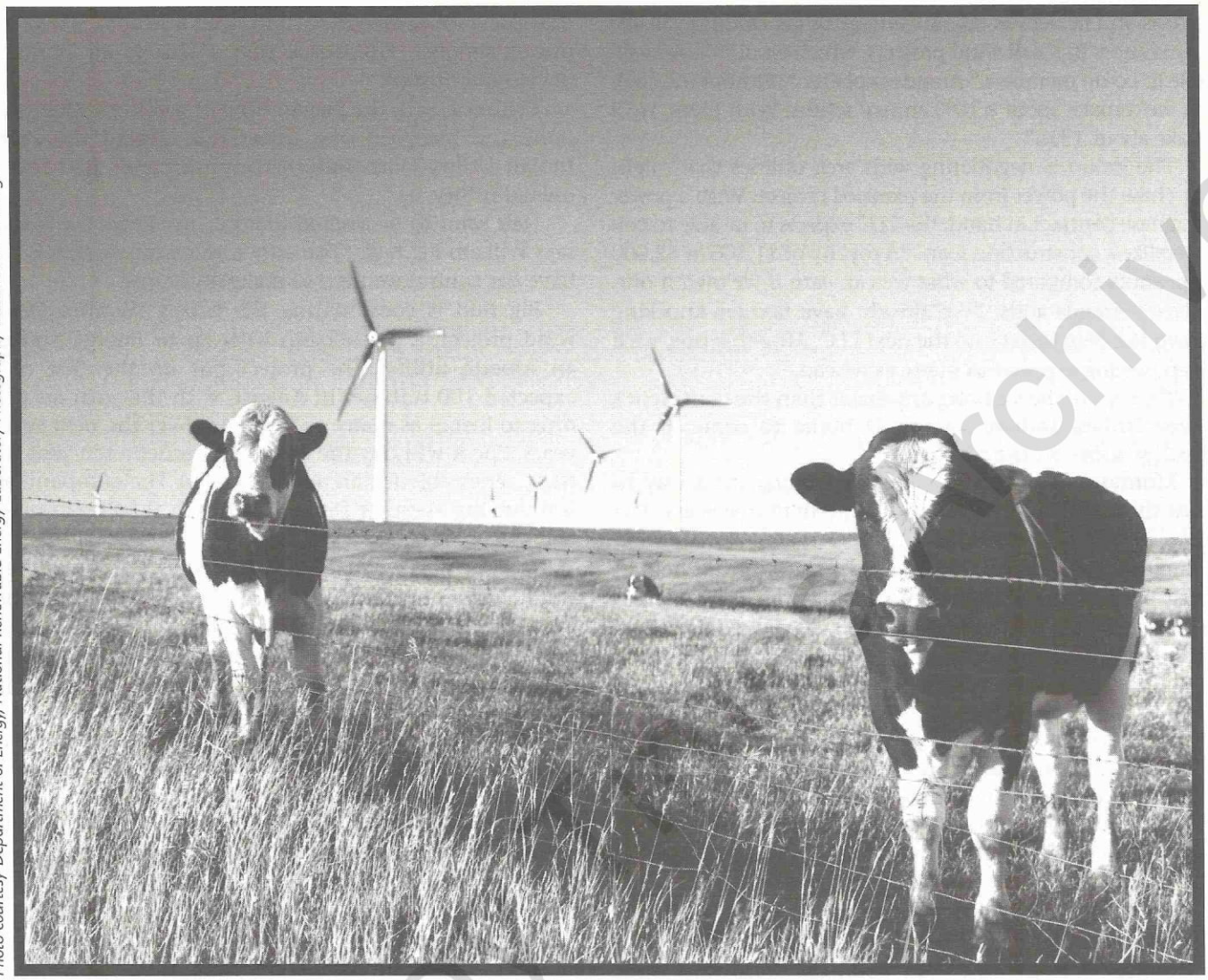


Photo courtesy Department of Energy, National Renewable Energy Laboratory Photography Information Exchange.

Minnesota Buffalo Ridge.

with a six-foot working model of a wind turbine and interactive displays. Each fall, the town also hosts an annual "Wind Fest" to promote the area and its contribution to the national energy solution.

"It's amazing the number of people who'd stop along the highway to see the turbines, then drive into town and say, 'What is that out there?'," Thompson says. "Since the wind project was built, we have an additional four specialty shops in town that weren't here, and wouldn't be here now except for tourism brought by the wind project."

The shops are a symbol of a brighter future, many believe. "Each megawatt costs about $1 million to build," Nichols says, "which makes this a $300-million project built without government money other than tax incentives. We have a lot of construction jobs, higher farm incomes, and new property taxes to improve our schools. We can educate our kids and provide them with a chance for good, well-paid jobs when they graduate. Our county has been losing population, struggling to survive. Keeping money here will help us keep our young people here."

Having sniffed potential wealth in the wind, some farmers have begun to take steps to eliminate middle-man developers. A few farm communities, such as Worthington, Minnesota, on the Iowa border, have begun to put together municipal utilities to buy and distribute wind-generated electricity from nearby farms. Several groups of farmers are pooling their savings to form limited liability corporations and build wind farms that they'll own themselves.

"This is a chance for us to keep this money in our local communities for additional economic development," says Tom Arends, who raises corn, soybeans, and hogs on 2,000 acres near Luverne, Minnesota, about 50 miles south of Lake Benton. Arends is part of a 30-member LLC hoping to raise capital to build a 1.9-megawatt wind farm. "Right now, that money waves bye-bye to us as it travels down the transmission line."

To cash in, farmers are abandoning the legal structure of the rural electric and producers' cooperatives that have shaped much rural development in the past. Corporations not only avoid some of the regulatory obstacles that cooperatives pose to farmers planning wind projects, but also put more money in shareholders' pockets. "Structuring our ven-

New Energy Archive

ture as an LLC lets us take advantage of tax credits available to investors in small wind projects, which wouldn't be available to co-op members," Arends explains. "Without the credits, we'd make about a 10% annual return. With them, we'll make about 17%."

The group is negotiating with area utilities that might purchase the power from the planned project. With a power purchase contract in hand, the LLC expects to be able to collateralize a construction loan. "A royalty of $1,500 or $2,000 is peanuts compared to what we can earn if we own it ourselves," Arends adds. "We already have farmers knocking down the door to get into the next LLC. After that one, we'll keep putting together as many as we can."

They won't be working any faster than the continent's native tribes. Indian country is home to some of the gustiest spots on the plains.

Montana's Blackfeet have been looking for a way to turn those breezes into cash for more than five years. The tribe negotiated with a few developers, but found them reluctant: Indian lands are owned by the tribe but held in trust by the federal Bureau of Indian Affairs. Any leases or other kinds of land-based deals have to be walked through, and approved by, the Washington agency. In 1999, the tribe talked with SeaWest WindPower, Inc., a private San Diego wind developer that has built projects on three continents.

"The company was open-minded about our needs and willing to work through some of the regulatory aspects," says Dennis Fitzpatrick, general manager of Siyeh Development Corp., the tribal organization managing the wind project.

No turbines are spinning yet, but already the project has expanded its scale. Originally, the Bonneville Power Administration agreed to buy about 25 megawatts from the project. But with regional demand rising, and after discovering more unused capacity than it thought in nearby transmission lines, the BPA is ready to take from 36 to 66 megawatts.

At first, the tribe will collect lease payments and a royalty—but it's not willing to settle for that. "Under current tax law, it's hard for any tribe to be an equity owner in a project like this," Fitzpatrick explains. "Because the tribe is a sovereign government, it's not able to take advantage of IRS tax credits for renewable energy. Those credits are a large part of what makes a wind project work economically today in our area." The tribe is talking to the U.S. Department of Agriculture's rural utility service about low-cost, guaranteed financing. Also, the Blackfeet's contract with SeaWest includes the right to buy into the project in the future.

But that's only the beginning. SeaWest will train tribal members to repair and maintain the turbines, and the tribe is working to include some of the technical courses in the local community college's curriculum. With Glacier National Park next door to the reservation, the tribe also expects the wind farm to attract tourists—who, in turn, will need places to eat and stay.

"We're looking at the project as a way to attract businesses to the reservation, such as electronic assembly, that use a lot of electricity and need a steady, reasonably-priced supply," Fitzpatrick says. "This is an economic development tool."

Farther north, the Piegan tribe in southern Alberta has done the Blackfeet one better. It's created the Piegan Indian Utility Corporation, the continent's first Indian-owned utility.

"We want to be assured that our needs are being met," says William Big Bull. "The only way we can do that is if we have the control we need to make decisions."

Big Bull is coordinating the tribe's Weather Dancer wind project, a partnership with Epcor Energy Services, an Alberta utility. The project put up the first of an expected 100 turbines in August, with the partners planning to install as many as 200 more over the next several years. Epcor will buy the electricity under a ten-year contract, renewable for an additional ten The company also is financing Weather Dancer, of which the Piegan nation will own half.

The partners estimate that a 100-megawatt wind farm would spin out about $15 million in annual revenue, with $7.5 million going to the tribe and its 3,025 members. "We also have the right of first refusal if our partner decides to sell its share," Big Bull adds, "so at some point we could own 100% of the project."

Even before the first turbine is in place, the project has delivered benefits. The economic value of the tribe's 2,027 acres slated to host the turbines has doubled, from about $40 an acre under agricultural use to more than $75 as a wind site. (Because the land is owned by the tribe, no private landowners' interests have been displaced.) The joint venture also has broken legal and regulatory ground that other Canadian tribes can use to set up their own wind partnerships and utilities.

The tribe hopes to use its newfound power—financial as well as electrical—to build smaller, tribally-owned wind farms to supply electricity to the reservation. "Our goal is to have at least 50% of our own power supplied by the wind," Big Bull says. Those projects also could attract industry, perhaps even a plant to make turbines and the towers that support them. "There are jobs tied to this," Big Bull says. "There's tourism, possibly manufacturing. We won't know what all the potential benefits are until the project is farther along."

An early benefit, however, is a new sense of the tribe's power. "We aren't depending on the government to make this happen," Big Bull points out. "We're using our own resources to become independent. This proves that we have the ability to become a player in a market driven by private corporations."

Those who live in North America's windy places have earned the chance. "We've been in the right place for wind for a long time," Big Bull says. "Now, thanks to improved technology, it's also finally the right time."

***Bennett Daviss covers energy, science, and technology for several national publications.***

New Energy Times Archive

# ECLECTIC OBSERVER

Compiled by Eugene Mallove

## DOE Public Hearing in D.C.

Cold fusion researcher Dr. Talbot Chubb sent us a report on his visit to a recent Department of Energy meeting in Washington, D.C. We present it in condensed form:

"The June 26 meeting at the Washington Hilton on Connecticut Avenue was the seventh of seven public meetings (Atlanta, Chicago, Boston, Seattle, Denver, Philadelphia, and Washington). It was not a meeting for scientific presentations; it was like a hearing held in an auditorium. In the front of the auditorium was a long dais behind which sat up to five officials of DOE, maybe all from the Office of Energy Efficiency and Renewable Energy (EERE). Facing these officials was a podium from which presenters made their five-minute prepared statements. The DOE officials changed during the course of the day and seemed to be always very attentive and courteous.

"The presentations began at 9:00 a.m., with the first hour of presentations by public officials rather than the general public. Many of the speakers seemed to have had past contact with DOE. Many of them talked about programs that had been jointly funded by DOE and industry. A considerable number of speakers were from industry associations. There were also talks from social advocacy groups like Greenpeace and the Sierra Club.

"The statements covered a wide range of activity, such as energy efficient lighting, wind power, photovoltaic, concentrated solar power, hydrogen and methane fueled vehicles, fuel cells, insulation, thermally efficient window glass, support of inventions, Indian reservations with energy programs, etc.

"Most of the statements were supportive of DOE's renewables program. The social advocates were largely critical of the Bush Administration's emphasis on energy supply rather than conservation. Cold fusion was mentioned only once, other than by me, in the six hours or so that I was there. In addition to the oral statements made, the DOE EERE Office accepted written statements limited to four pages. I have e-mailed a statement to DOE about cold fusion."

*Dr. Chubb's basic statement to DOE:*

It is my view that DOE's Hydrogen Program has missed an important opportunity for developing new national energy supply. It has failed to properly consider the large amount of nuclear energy available in mass-2 hydrogen. In 1989 Professors Fleischmann and Pons presented evidence that this nuclear energy could be tapped using chemical techniques. When tapped in this way, the energy is made available without the dangerous radiation accompanying normal nuclear power generation.

Since 1989 a struggling cold fusion community has continued to do research. It has confirmed the original Fleischmann and Pons claims, developed methods that more reliably liberate the nuclear heat, and have quantitatively identified the nuclear reaction product. The nuclear reaction product is helium gas, which is already present in air at about five parts per million concentration. The researchers have also identified two rare side products that are unique signatures of a nuclear process. In another study they have shown that the nuclear heat can be produced at elevated temperature in a controllable manner.

DOE's future Hydrogen Program should include work on this chemically induced nuclear energy. Mass-2 hydrogen is called deuterium. DOE should start a new program by first requesting the National Academy of Sciences to evaluate the recent results on radiationless deuterium fusion. I have sent DOE a list with key references. DOE should then sponsor continuing work in this area.

Vice President Cheney's National Energy Policy Report states that U.S. conventional production of natural gas is projected to begin declining as early as 2015. The goal of the DOE program should be to develop the technology that makes it practical for radiationless deuterium fusion heat to start replacing natural gas in residential heating before this decline in natural gas production begins.

Talbot Chubb
Fellow, American Physical Society
Presentation to DOE on 26 June 2001

## Impulse "Gravity Generator" — HTSC Antigravity Redux?

In 1996, *Infinite Energy* (No. 9, pp. 49-50, "Table-Top Antigravity?" by Chris Tinsley) and many other publications, including *Business Week* (September 30, 1996, p. 42) covered the astonishing claim of physicist Eugene Podkletnov (then of Tampere University in Finland), that he had created an anti-gravitational zone above a rotating, magnetically suspended high-temperature superconductor (HTSC). Later, Charles Platt covered the story in a lengthy feature article in *Wired* magazine. Now the anti-gravity claim appears to be back with a vengeance, witness the paper posted on the Los Alamos National Laboratory Physics website: http://xxx.lanl.gov/abs/physics/0108005

The contention is now that electrical discharges from a superconducting electrode manifest as an "impulse gravity generator." Emission of "radiation" occurs, "which propagates in a focused beam without noticeable attenuation through different materials and exerts a short repulsive force on small movable objects along the propagation axis." We offer the intriguing abstract of this article below.

This announcement comes on the heels of the revelation that Dr. Paulo and Alexandra Correa in Canada have discovered a pervasive antigravity phenomenon, which derives from

New Energy Times Archive

their extensive experimentation with what they claim to be a complex, energetic aether. In fact, this writer was able to observe a clear 70% weight reduction in a 43 milligram suspended gold foil in the Correa laboratory (see www.aetherometry.com, letter of support by Mallove). It remains to be determined how these two distinct methods of producing gravity "impulse" and anti-gravity effects may be related in a more comprehensive physics. By now it should be abundantly clear that standard physics is breaking down in many ways, especially in areas that have enormous potential technological application. A word to some of the wiser ostriches who continue to buy into twentieth century Fizzix: take your head out of the sand!

**Impulse Gravity Generator Based on Charged $YBa_2Cu_3O_{7-y}$ Superconductor with Composite Crystal Structure**

By Evgeny Podkletnov (Moscow Chemical Scientific Research Center) and Giovanni Modanese (California Institute for Physics and Astrophysics; also Univ. of Bolzano, Industrial Engineering)—(32 Pages, 7 figures)


**Abstract**

The detection of apparent anomalous forces in the vicinity of high-$T_c$ superconductors under non equilibrium conditions has stimulated an experimental research in which the operating parameters of the experiment have been pushed to values higher than those employed in previous attempts. The results confirm the existence of an unexpected physical interaction. An apparatus has been constructed and tested in which the superconductor is subjected to peak currents in excess of $10^4$ A, surface potentials in excess of 1 MV, trapped magnetic field up to 1 T, and temperature down to 40 K. In order to produce the required currents a high voltage discharge technique has been employed. Discharges originating from a superconducting ceramic electrode are accompanied by the emission of radiation which propagates in a focused beam without noticeable attenuation through different materials and exerts a short repulsive force on small movable objects along the propagation axis. Within the measurement error (5 to 7 %) the impulse is proportional to the mass of the objects and independent of their composition. It therefore resembles a gravitational impulse. The observed phenomenon appears to be absolutely new and unprecedented in the literature. It cannot be understood in the framework of general relativity. A theory is proposed which combines a quantum gravity approach with anomalous vacuum fluctuations.


## Mars Teeming with Life, Past and Present?

For years, it has seemed to me that mainstream planetary scientists were marginalizing important evidence concerning the possibility of both extant and extinct life forms on Mars. There is, of course, the controversial matter of Cydonia region imagery (including the Mars "face," only the *first* of other such "faces"!), which astronomer Dr. Tom Van Flandern and others have investigated. (See Tom's astonishing assessments from NASA-provided imagery at www.metaresearch.org.)

Engineer Chip Ransford of Denver, Colorado (better known for his work in cold fusion for Nova Resources Group) has now done extensive analysis of what he considers to be large *moving* life forms in a Martian crater and elsewhere. See his examination and image animations at: http://www.neighborsnet.com/Mars

While doing this work, Ransford stumbled across another website by the "Independent Mars Research Group" (IMRG) (http://www.marsunearthed.com), which has gathered a remarkable collection of provocative images. Ransford has selected and annotated a subset of the sixty image pairs that he finds instructive. On August 10, he sent an email to a small band of "Mars heretics," which now informally includes Sir Arthur C. Clarke. In 2001 Clarke has stated publicly that he is greater than 95% convinced that large life forms exist—or have existed—on Mars, based on his examination of NASA-provided images. Ransford's note:

> "Here is a baker's dozen of what I thought were the most interesting for one reason or another, selected from that set [from the IMRG site]. All the links are to fairly high res image pairs (or more) on their site, and all images seem to actively link back to MSSS (or NASA) for access to the originals and data sheets. You can get to the niceties of their site by clicking the red arrow near the top left of each page. Its an easy to use site, and I also suggest clicking the 'selected images' header bar (they've found some of the same branching structures that Greg Orme has). I've included my brief notes below each link, along with the time between shots and the latitude. Enjoy, Chip"

http://www.marsunearthed.com/CompPages/Comp003/Comp003mages.htm
4 coincident shots on perm. ice cap at 87S
http://www.marsunearthed.com/CompPages/Comp006/Comp006mages.htm
two weeks - growth? @ 87S
http://www.marsunearthed.com/CompPages/Comp007/Comp007mages.htm
3 days - dramatic sun angle change highlights something @ 87S
http://www.marsunearthed.com/CompPages/Comp010/Comp010mages.htm
one week - spot changes @ 87S
http://www.marsunearthed.com/CompPages/Comp019/Comp019images.htm
Changes @ 87S
http://www.marsunearthed.com/CompPages/Comp037/Comp037images.htm
3 months - spots @ 73S
http://www.marsunearthed.com/CompPages/Comp041/Comp041images.htm
1 month - spots @ 69S
http://www.marsunearthed.com/CompPages/Comp043/Comp043images.htm
5 weeks - shrubbery? @ 63S
http://www.marsunearthed.com/CompPages/Comp046/Comp046images.htm
2 weeks - spots @ 87S
http://www.marsunearthed.com/CompPages/Comp047/Comp047images.htm
4 days - sun angle change @ 87S
http://www.marsunearthed.com/CompPages/Comp048/Comp048images.htm
9 months - lines (exceptional) @ 20S
http://www.marsunearthed.com/CompPages/Comp052/Comp052images.htm
6.5 months - unknown on the ice cap @ 87S
http://www.marsunearthed.com/CompPages/Comp054/Comp054images.htm
5 months - visceral on the ice cap @ 79S

Another very important website, which deals with Mars imagery containing possible evidence of large life forms, is found at: http://members.nbci.com/marsattrak/six/default.htm

The site is run by Greg Orme of Australia, who, according to Dr. Van Flandern, "is an amateur who plunged into the MGS imagery in more depth and volume than anyone else I've heard of." Orme's co-author is Peter Ness, who has a geology background.

The message in all this Mars-oriented creativity seems to



New Energy Times Archive

be, "The question of life on Mars is too important to be left to NASA/JPL bureaucrats."

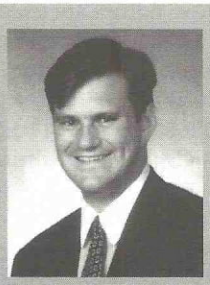
In July, an Associated Press story item found its way into the the *Concord Monitor* newspaper in New Hampshire. "Scientist's Data shows signs of life on Mars," by AP reporter Andrew Bridges, reports that Associate Professor Joseph Miller, of the Department of Cell and Neurobiology at the University of Southern California in Los Angeles, reported in San Diego (at the 46th annual meeting of the International Society for Optical Engineering) that he has re-examined the 1976 Viking lander biology experiments and found compelling evidence of extant microbial life. According to reporter Bridges, Miller "detected distinct rhythms in the levels of gas given off during the range of experiments that sought to prompt the growth of microbial life in samples of Martian soil doused with water and nutrients." Miller attributes the patterns of gas evolution and decline to circadian rhythms of the purported Mars bacteria, which are also found in terrestrial microbes. The consensus view of scientists has been that anomalies seen in the Viking lander biology experiments can be attributed to unusual chemical activity (of peroxides) in the Martian soil.

Bridges writes: "Miller, an expert in circadian rhythms, said he has analyzed about 30 percent of the Viking data. So far, he said, he has found that gas levels produced during the various experiments varied as much as 3 percent during regular periods that matched the length of a Martian day, slightly longer than an Earth day. He said he is '90 percent' sure the results point to the existence of life."

At another mainstream scientific gathering, the 32nd Lunar and Planetary Sciences meeting (2001), scientists from Hungary presented a paper concerning images of changing dark spots on dunes, which they regard as significant evidence of present Martian life. I and others had been looking at those "dalmatian-like" images for some time, wondering *when* some planetary scientist would go public to discuss what appeared to be compelling evidence of some kind of biological activity (either that or diffusion of chemicals in Martian sand dunes.) The paper: "Probable Evidence of Recent Biological Activity on Mars: Appearance and Growing of Dark Dune Spots in the South Polar Region," by A. Horváth, T. Gánti, A. Gesztesi, Sz. Bérczi, and E. Szathmáry. The authors state: "We conclude that even a complex sublimation process is insufficient to explain the formation and evolution of the DDS [Dark Dune Spots] in space and time. A new key player is required and it might be a form of primitive life activity."

## *Time* Magazine "Funnies"

*Time* Magazine, no friend of either cold fusion or the research of Wilhelm Reich on "orgone energy" (see my Breaking Through Editorial, Issue No. 37), is at it again. In its June 11, 2001 issue, a full page is devoted to a cartoon strip, "Can't you Feel the Placebo?" which pokes fun at several contemporary political and cultural issues. In one of six segments, a hippy-looking "dot.com" nerd is lecturing wealthy investors. He says, "My business plan is to retail perpetual motion machines and orgone boxes—on a Website—with content." The cigar-smoking tycoons reply: #1: "Hmmm. Sounds risky."; #2: "We're in. Will $40 million do for starters?"; #3: "He's the new Henry Ford. You heard it here first." Prediction: *Time* magazine will eventually dig up this trashy cartoon and claim that they foretold the new Aether Energy Age! ■■■



### Former CETI Executive Dies Unexpectedly

Jim Reding, the former CEO of Clean Energy Technologies, Inc. (CETI) of Sarasota, Florida, died suddenly, Monday, July 16, from a brain aneurysm. At the time of his death, Jim was the president and CEO of the medical products manufacturing firm Bio-Life, formerly based in Sarasota. Bio-Life makes a topical, iron-based compound hemostat, which stops bleeding on contact. One of the inventors of the product is Jim's grandfather, Dr. James Patterson, who is famous for developing the excess heat and nuclear transmutation cells that are based on patented thin metal film-coated plastic beads.

At the time of his death the 31-year-old Reding was said to be in excellent health. In the spring he had moved his three-year-old Bio-Life company from Sarasota to the Airport Commerce Center in South Manatee County.

The Bio-Life hemostat comes in individual packets of powder. It is marketed to medical professionals and consumers, including hemophiliacs and people taking anti-coagulant medications. The cost per application is only about $1. It is a Food and Drug Administration (FDA)-approved product that is undergoing further effectiveness trials at Sarasota Memorial Hospital and test marketing in the Sarasota area.

Marketing and sales director Doug Goodman was quoted in the *Sarasota Herald-Tribune*, "We're going ahead as we were before. The plans for the company have been laid out pretty clearly. . . Jim Reding was a true visionary."

Born January 21, 1970 in San Luis Obispo, California, Jim Reding graduated in 1992 from Southern Methodist University in Dallas, Texas. While still in Dallas, he helped to found Clean Energy Technologies, Inc., which was based on the revolutionary cold fusion/LENR inventions of his grandfather, Dr. James Patterson. Jim Reding came to Sarasota to set up CETI's offices about four years ago.

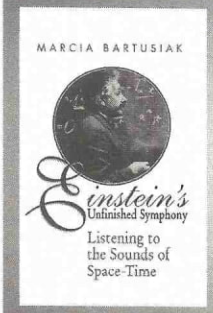
Jim Reding is survived by his wife of seven years, Joanne; two sons, Jimmy C. and Jackson R.; his parents Robert and Sherill of Dallas; his maternal grandparents, Gene and Louise Kohler of Navarre, Flordia and Dr. James and Elsa Patterson of Sarasota; and his paternal grandparents, Sam and Bonnie of Reno, Nevada; and his paternal grandmother, Klara, of Reno.

This writer last met Jim Reding at ICCF-8, the Eighth International Conference on Cold Fusion, which convened in Lerici, Italy in May 2000. Jim and his grandfather, who also attended ICCF-8, had continued their interest in the science and commercial prospects of low-energy nuclear reactions. In 1995, Jim and Dr. Patterson were featured on the cover of Issue No. 2 of *Infinite Energy* and in many subsequent articles. Energetic and creative septuagenarian Dr. Patterson continues to work on excess-heat producing devices based on thin metal films. Our last brief report on CETI was in *Infinite Energy*, Issue No. 35 (p. 22), January/February 2001. I hope and expect that the dreams and promise of CETI will not have died with the passing of Jim Reding.

—*Eugene Mallove*

New Energy Times Archive

# Book Reviews




## Einstein's Unfinished Symphony: Listening to the Sounds of Space-Time

by Marcia Bartusiak
ISBN 0-309-06987-4
$24.95 Hardcover, 249 pp.
Joseph Henry Press, 2000

**Review by Jon Norris**

I think it is safe to say that no scientist in the twentieth century had as strong an influence on physics, or science in general, as Albert Einstein. The impact of his Special and General Relativity theories has been extremely powerful. Much has been written about him and his work, and he became quite a celebrity in his time.

Interestingly enough, this book is not about him, but about the continuation of his work. Bartusiak's writing flows in a very pleasant, readable style, and the book is filled with anecdotes about various projects created to explore the validity of Relativity. She recounts stories from the personal perspective of various key individuals in physics research, adding emotional depth to a subject that is usually somewhat cold and dry for those without the intense math background to understand its subtle nuances.

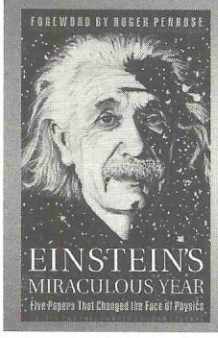
This is not, however, a book about physics. It is directed at a very non-technical audience. At one point, there is a footnote explaining scientific notation, which is a grade-school level topic. If you are interested in cutting-edge science or deep discussion of controversial issues, this is not the book. This work is a light overview of some very mainstream historical information. It is a popularization of the status quo view of the scientific establishment. There is mention in various places of the difficulty in doing experiments to verify Relativity due to such things as the possibility of getting different results depending on the nature of the coordinate system one chooses and so on. She does not, however, go into such things in any depth, merely mentioning them as background for some of the disagreements between scientists.

She mentions cold fusion once in connection with problems with Joseph Weber's gravity wave experiments, but goes no further in explaining or enlightening the reader about that controversy.

Obviously, I have a problem with the narrow view of physics portrayed in the book. Near the end she says that the problem of determining the amount of gravity radiation bathing the Earth depends on the theoretical model chosen. While I suppose that is true in the sense that the model determines how and what you look for, I would think that it depended more on creating the best equipment for measuring the gravity radiation. The gap between theorists and experimentalists is touched upon, but not explored in any concrete way.

It interesting to note the tolerance for long decades without definitive data for gravity waves in contrast to the knee-jerk attacks on cold fusion and new energy research. In one story about building a massive facility for gravity research at Hanford, Washington, she mentions that the electricity bill for one step of one process in preparing one part of that facility was over $60,000. How many cold fusion experiments would that sum fund? It is a good look at the nature of doing research in a "safe" area such as Relativity, as opposed to a truly cutting-edge area like cold fusion. The tolerance and congenial atmosphere that abounds in providing massive funding for research which has given us virtually no results in several decades is amazing. One quote about how the Wright brothers were allowed many mistakes in their work toward flying is ironic and leads me to believe that the person making that statement knows very little about the actual events. The Wright brother's flying experiments are an outstanding example of the complete and utter failure of the scientific establishment to behave in a truly scientific manner. On the same page is a remark about how the Bureau of Standards did a study to prove that the Hale telescope would be impossible to build. While these statements are recorded, there is no analysis or comment upon the meaning, importance, or context of such beliefs in the scientific community.

None of this means that I don't like the book. It is quite well-written, and Bartusiak's style makes for an enjoyable read. She has many interesting quotes from prominent physicists, such as John Wheeler's remark that teachers who leave a classroom without having learned something themselves do not know how to teach. It is a good book for fleshing out some of the details of how science really works today, and adding some depth to the personalities of scientists whose names are usually just facts connected to discoveries. The book is organized by topic, such as astronomical and gravitational research, not in chronological order, which makes the stories a bit harder to put into context. I would not recommend it as a primary book on science, but it does have merit in providing some cultural ambience to these research pursuits.




## Einstein's Miraculous Year: Five Papers That Changed the Face of Physics

by John Stachel, Ed.
ISBN 0-691-05938-1
$24.95 Hardcover, 198 pp.
Princeton University Press, 1998

**Review by Bill Cantrell**

When it comes to Albert Einstein's original works, you may have wondered what all the hoopla was about. This book gives you the chance to find out with a nice little tour through his five important papers of 1905. The book will appeal to scientific readers at all levels of expertise, both for its technical content, and for its historical perspective. The primary reason to focus on the year 1905, of course, was Einstein's celebrated paper on Special Relativity, but Stachel includes four others. He presents the actual works in their entirety (all in English) and provides

New Energy Times Archive

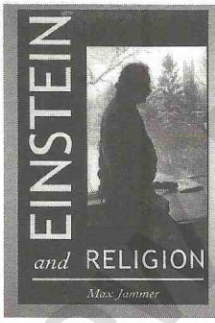
commentary on their importance and meaning. The papers are offered, warts and all, with the original typos and mathematical errors included. Stachel calls attention to these in a discreet manner by providing footnotes to explain the glitches and corrections. He notes that in later releases, some of Einstein's papers were reworded by others to clarify certain passages.

The first two papers on parade are "A New Determination of Molecular Dimensions," and "On the Motion of Small Particles Suspended in Liquids at Rest Required by the Molecular-Kinetic Theory of Heat." In these Einstein looks at Brownian-motion and attempts to extend and perfect the classical-mechanical approach at the kinetic-molecular level.

The third paper is Einstein's special relativity opus, "On the Electrodynamics of Moving Bodies." Here Stachel is to be credited for making the point that relativity theory is not so much a revolutionary paper, but a culmination of the classical electrodynamics of the nineteenth century. The fourth paper is entitled "Does the Inertia of a Body Depend on Its Energy Content?" and is an extension of the third. In these, Einstein attempts to modify the foundations of classical mechanics in order to remove the apparent contradiction between mechanics and electrodynamics. There is also some commentary among Planck, Einstein, and Stark about who first discovered the connection between inertial mass and energy.

In the fifth paper, "On a Heuristic Point of View Concerning the Production and Transformation of Light," Einstein introduces the hypothesis that light has a granular structure in order to explain certain novel phenomena, such as the photoelectric effect. Einstein considered this to be a truly radical idea, and it was for this work, not for Special Relativity, that he later received the Nobel Prize in 1922.

Unlike the tedious and incomprehensible papers of today, where the goal seems to be obfuscation, it is refreshing to observe how straightforward the papers of this time period were. Overall, the book covers an interesting range of material, and can be completed in a few evenings.




## Einstein and Religion

by Max Jammer
ISBN 0-691-00699-7
$26.00 Hardcover, 279 pp.
Princeton University Press, 1999

**Review by Eugene F. Mallove**

Apart from Albert Einstein's physics, which has been passionately embraced by the establishment though criticized by a vocal (and ignored) minority, Einstein is certainly one of the most often-quoted physicists in the matter of religion and its relationship to science. I had expected this book by Max Jammer to be a warmed-over restatement of many of Einstein's views on the science-religion connection. To my delight, it is quite the contrary. *Einstein and Religion* is a wonderful, impartial book, and an excellent compilation of Einstein's views and the reaction to them by twentieth century theologians and laypeople—both during Einstein's time and afterward.

The concise praise for this book offered by David Cassidy (author of *Uncertainty: The Life and Science of Werner Heisenberg*) is merited: "No other work offers as broad an account of Einstein's views on the relationship between science and religion or brings together all of the different facets of the topic in one short, easily accessible account. *Einstein and Religion* also offers a badly needed critique of some of the many misinterpretations and misuses of Einstein's views."

Einstein, in an apt self-evaluation culled by Jammer, called himself a "deeply religious nonbeliever." His pantheistic religious views have been associated closely with those of seventeenth century Dutch Jewish apostate and outcast, Baruch (later Benedict) Spinoza. Einstein often cited Spinoza, who, like himself, could not abide the concept of a "personal" God. But Einstein's views on science and religion were much more complex, as this work forcefully brings out. For example, Einstein had *active* disdain for atheism. Jammer quotes him (p. 97): "In view of such harmony in the cosmos which I, with my limited human mind, am able to recognize, there are yet people who say there is no God. But what really makes me angry is that they quote me for support of such views." Jammer cites Einstein's friend Max Born's opinion (p. 96): ". . .he [Einstein] had no faith in the Church, but did not think that religious faith was a sign of stupidity, nor unbelief a sign of intelligence." Einstein's reaction to the public response to his prominent 1940 essay, "Science and Religion," goes further: "I was barked at by numerous dogs who are earning their food guarding ignorance and superstition for the benefit of those who profit from it. Then there are the fanatical atheists whose intolerance is of the same kind as the intolerance of the religious fanatics and comes from the same source."

Max Jammer, Professor of Physics Emeritus and former Rector at Bar-Ilan University in Israel, strictly adhered to his disclaimer in the beginning of this work: "It cannot be emphasized too strongly that this study has no missionary intention whatever and does not attempt to convert the reader to Einstein's concept of religion. Nor does it intend even to defend his position or his philosophy of religion." He further opines that Einstein himself ". . .would never agree to proselytize people to his own religious conviction." That is evident from the large selection of Einstein quotations Jammer has assembled.

The book is in three parts; the first is biographical, "Einstein's Religiosity and the Role of Religion in His Private Life." It is well-known that Einstein grew up in an irreligious Jewish family in southern Germany, but less familiar is his education at a Catholic public primary school. The second part is a meaty discussion of "Einstein's Philosophy of Religion," in which quotation of his views and responses to them by others takes central stage. The third part is an important discussion of the influence of Einstein's *physics* (mostly his relativity theories) on theology. Since in this reviewer's opinion, distilled from critics' work and recent experiment, Einstein's Relativity theories are *not* the correct physics of this universe, it is indeed unfortunate that contemporary religion appears to have assimilated the false Einsteinian "cosmology" of space-time.

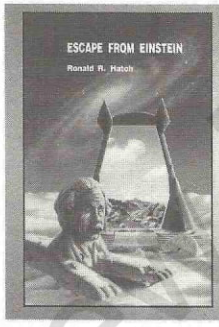
New Energy Times Archive

For all the wrongly directed science that has come from the hegemony of Relativity physics over the past century, there is surely much good that can emerge from reading the opinions of Einstein about religion and reflecting on them—whatever one's primary beliefs. I, for one, have always felt a kinship with Einstein's views on religion, even though his philosophical blind-spots in that area are also apparent. Einstein had a wonderful sense of the subtlety and paradox of the religion-science connection. I thank Max Jammer for finding these gems from Einstein: ". . .it is precisely among the heretics of every age that we find men who were filled with this highest kind of religious feeling and were in many cases regarded by their contemporaries as atheists, sometimes also as saints. Looked at in this light, men like Democritus, Francis of Assisi, and Spinoza are closely akin to one another." (p. 78) And: "We followers of Spinoza see our God in the wonderful order and lawfulness of all that exists and in its soul ('Beseelheit') as it reveals itself in man and animal. It is a different question whether belief in a personal God should be contested. Freud endorsed this view in his latest publication. I myself would never engage in such a task. For such a belief seems to me preferable to the lack of any transcendental outlook on life, and I wonder whether one can ever successfully render to the majority of mankind a more sublime means in order to satisfy its metaphysical needs." (p. 51)

Max Jammer treats extensively, and from different reference frames, the centerpiece of Einstein's beliefs, his famous: "Science without religion is lame; religion without science is blind." Jammer also quotes a marvelous poem of J.W. Goethe's with which he thinks Einstein would have agreed:

> He who possesses science and art
> possesses religion as well;
> He who possesses neither of these
> had better have religion. (p. 79)

It seems clear that Einstein was the former type of person.




## Escape from Einstein

by Ronald R. Hatch
ISBN 0-9632113-0-7
$29.50 Hardcover, 232 pp.
The Kneat Company, 1992

**Review by Eugene F. Mallove**

This is an audacious book, because it challenges both Special and General Relativity and proposes a *testable* replacement to both theories. Author Ronald Hatch, a mathematician and physicist by training, has been a notable and award-winning participant in the modern development and use of satellite navigation systems. He holds eight patents in the field and is the inventor of a public-domain noise-reduction technique now employed in virtually every GPS receiver, referred to in FAA documentation as the "Hatch filter." So when he speaks of the various tests of relativity (and of his own challenging theory) that can be performed within the context, for example, of the GPS satellite system, one can be sure that he speaks with some authority.

This book, though accessible to non-experts, particularly in its dissection of the "Twin-paradox" of Special Relativity, is primarily aimed at specialists who have considered the failings and paradoxes of Einstein's relativity theories. Like the handful of other good books that mount a credible challenge to these cherished theories, it is not a well-known book—not well-known, perhaps, even to the community of relativity critics. His book is most useful in its elaborate description and cataloging of all experiments that *appear* to support or apparently *do not* support Einstein's relativity theories. And, he proposes other experiments that might discriminate the winning theory—Einstein's versus Ronald Hatch's "ether gauge theory" (which later evolved and became known as MLET, "Modified Lorentz Ether Theory," in the paper that appears in this issue of *IE*).

Hatch gives a capsule summary of what his theory accomplishes: "The alternate theory employs a solid mechanical ether, a concept that was discarded at the turn of the century. A particular ether is proposed such that the presence of mass results in compaction of the ether which is the same as an apparent curvature of space. The bottom line is a gravity theory very similar to the general theory. But now the equivalence principle can be used in the opposite direction—to go from a gravity theory to a velocity theory. The resultant velocity theory explains the same phenomena as the special theory—but without any paradoxes."

Hatch's work is actually more ambitious than a dissection and reformation of relativity theory; his theory audaciously dispenses with the Lorentz transformation. He finds inspiration from his ether-based theory to speculate on the structure of subatomic particles (the electron in particular), to delve into alternate interpretations of quantum mechanics, and to find grounds for unifying the several fundamental forces of nature. He says of his theory, "It predicts results clearly distinguishable from the special and general theories. *May the theory which corresponds to reality win.* I believe we shall soon *escape from Einstein.*" This is a book and a theory, correct or not, which deserves extended study.

## LIGO: Prelude to Revolution

by Edwin E. Hatch
ISBN 1-58500-794-3
$16.00 Paperback, 229 pp.
1st Books, 1999

**Review by Eugene F. Mallove**

This book foretells a revolution in physics when the famous LIGO (Laser Interferometer Gravitational-wave Observatories) and like experiments in other countries fail, the author firmly predicts, to detect gravity waves coming from distant cosmic sources. Of course, author Ed Hatch is a bit "biased," being the brother of Ronald Hatch (*Escape from Einstein,* 1991). Ron Hatch's theory predicts "gravity

New Energy Times Archive

waves," but not of the type that are "space-time"-distorting. Thus, it is said, no such waves will be detected by these large and very expensive instruments, the subject of such adulation in Marcia Bartusiak's *Einstein's Unfinished Symphony* (2000) and in the general science press.

Ed Hatch's book, brilliantly executed in a tradition that dates back to Galileo, is a series of fictitious dialogues between a "believer" in Ron Hatch's MLET (Modified Lorentz Ether Theory), which challenges both Einstein's Special and General Theories of Relativity, and a selected skeptical physicist. The object of this instructive dialogue, which is an excellent device for illuminating the nature of the MLET theory and the failings of Einstein's relativity theories, is to document with a book-length formal prediction, the impending years of null results that the Hatch brothers say will be logged by LIGO and its kin. The good news is that the skeptical physicist is ultimately shaken and brought around to the Hatch perspective. The bad news is that such an imaginary conversion by a mainstream physicist to a non-SRT outlook is about as likely as winning the "Powerball" lottery.

One of the book's most endearing assets is a 39-page annotated appendix of source material from which mainstream scientists can be witnessed, somewhat comically sanctifying Einsteinian relativity. Example: "Albert Einstein became the ruler of modern physics by cutting the ethereal knot with the sharpness of his logic, and throwing the twisted pieces of the world ether out of the window of the temple of physical science." (*The Biography of Physics*, 1961, by George Gamow.) Or, "No physicist who is even marginally sane doubts the validity of special relativity." (Isaac Asimov, 1993.) ■■■

Electric Spacecraft Journal Network

Keeping you informed about independent research...

The ESJ Network assists individual research efforts, facilitates cooperation among experimenters and provides an open forum for the exchange of information and ideas.

The Network welcomes those engaged in experiments, analysis, conceptual thinking, and investigative research, who are willing to interact with others. Inquiries to: 828-683-0313 or 828-683-1280, Fax: 828-683-3511; Subscriptions: [quarterly] Electric Spacecraft Journal, 73 Sunlight Drive, Leicester, NC 28748 U.S. annual subscription rates: $24; Canada and Mexico $29; Overseas $39.

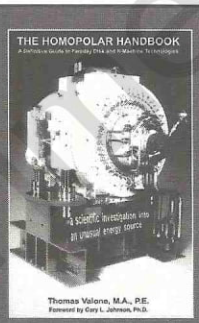
*Electrifying Times*

*Latest Electric Car News*

**Only $12.00* per year for 3 issues.**

**The only periodical in America with newsstand distribution covering the fast growing world of EVs and HEVs.**

**63600 Deschutes Market Road • Bend, OR 97701**
**Phone: (541) 388-1908 • Fax: (541) 388-2750**
**Website: www.electrifyingtimes.com**
**E-mail: etimes@teleport.com**
***$18.00/yr Canada; $21.00/yr International**




THE HOMOPOLAR HANDBOOK

by Thomas Valone

A Definitive Guide to Faraday Disk and N-Machine Technologies

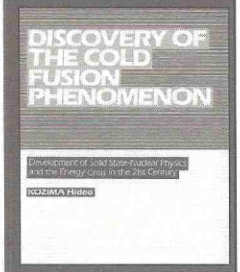
$23.95 No. America
$28.95 Foreign
Paperback, 188 Pages

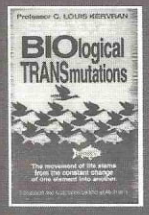
Discovery of the Cold Fusion Phenomenon: Development of Solid State-Nuclear Physics and the Energy Crisis in the 21st Century

by Hideo Kozima

Kozima delves into the history and science of the cold fusion/low-energy reactions discoveries, including experimental findings through 1998 of his own pioneering work and discussions of the scientific and social forces which have kept cold fusion energy from blossoming.

Paperback, 1998, 370 pp,
$60.00 North America • $70.00 Foreign




Biological Transmutations

by C. Louis Kervran

Paperback, 163 pp., 1980

$21.00 North America• $25.00 Foreign

ORDER FROM: Cold Fusion Technology, Inc.
P.O. Box 2816, Concord, NH 03302-2816
Phone: 603-228-4516 • Fax: 603-224-5975

21st CENTURY
SCIENCE & TECHNOLOGY

**Featured in the Spring 2001 Issue**

- Bring Science Back to Life: Vernadsky's Method Proceedings of a Conference Panel:
  - Vernadsky and the Science of Life *by Jonathan Tennenbaum*
  - The Ampere Angular Force As a Discoverable Type of "Natural Product" *by Laurence Hecht*
  - Biophysics and the Life Process *by Wolfgang Lillge, M.D.*
  - Is Mind a Mystery? *by Dino De Paoli*
  - Eurasian Development: The Next Step for the Biosphere *by Lyndon H. LaRouche, Jr.*
- Barry Fell's Revolution in Deciphering Old World Scripts *by Julian Fell*
- 100 Years of Quantum Physics: Max Planck's Unanswered Challenge *by Caroline Hartmann*
- 1999 Eclipse Studies Show the "Allais Effect" Is Real *by Henry Aujard*
- Where Do We Stand on Cold Fusion *by Edmund Storm*

**Subscribe!**

$25 for 6 issues (U.S.); $50 for 6 issues (Foreign)
Single copies $5 ($6 Foreign)
Send check or money order (U.S. currency only) to:
21st Century, P.O. Box 16285, Washington, D.C. 20041
**www.21stcenturysciencetech.com**


New Energy Times Archive

# Upcoming Events

## Eco-Natural 2002

Miami Beach, Florida
**April 19-21, 2002**
Miami Beach Convention Center

◆◆◆

**Top Environmental Speakers**
**Exhibit Hall with over 660 Manufacturers**

www.econatural2002.com
econatural2002@aol.com
Phone: 305-380-0376 ◆ Fax: 954-212-5879

## Windpower 2002

**June 2-5, 2002**
Portland, Oregon

Watch www.awea.org for information as it becomes available.

### Power-Gen International

◆◆◆

December 11-13, 2001

◆◆◆

Las Vegas, Nevada
Las Vegas Convention Center

**www.pennwell.com**

### 3rd Japan Meeting on Nuclear Reactions in Solid (JCF3)

**October 25-26, 2001**
Yokohama National University
Yokohama, Japan

**Contacts:**
*Kenichiro Ota* – ken-ota@ynu.ac.jp

*Akito Takahashi*
JCF - Desk, Takahashi Lab.
Dept. of Nuclear Engineering
Osaka University
Yamadaoka 2-1, Suita
Osaka, Japan
akito @ nucl.eng.osaka-u.ac.jp

### Conference on Space Physics

**November 9-11, 2001**
Karwar, Karnataka India

**Now accepting papers.**
**www.tewari.org**

SPG Conference 2001
Scientific & Spiritual Research Council
Conference Organizing Committee
P.O. Gotegali
Karwar, Karnataka 581 317 India

### The Ninth International Conference on Cold Fusion (ICCF9)

**May 19-24, 2002**
Beijing, China

## The Ninth International Conference on Cold Fusion (ICCF9)

*has been scheduled at the International Convention Center, Tsinghua University, in Beijing, China from May 19 to 24, 2002.*

The study of Cold Fusion (CF) phenomena, sometimes referred to as "New Hydrogen Energy" (NHE) is progressing in numerous laboratories all around the world. More than ten years old, the field is enjoying ever more reproducible experiments and better interactions with the scientific community. A large variety of experimental approaches will be addressed at the Conference, together with theoretical attempts to interpret the observed phenomena.

The important sponsorships that have been secured for ICCF9 (Fundamental Research Division, Ministry of Science and Technology Physics Division II, Natural Science Foundation of China, Chinese Nuclear Physics Society, Department of Physics, Tsinghua University) guarantee that the Conference will maintain the most rigorous scientific standards. As stated in Lerici at ICCF8, the theme of ICCF9 will be coherence: Coherence between Nuclear Physics and Solid State Physics; Coherence between Cold Fusion and Hot Fusion; Coherence between Research and Development. We are glad to see the progress in all three aspects in the past years.

**The following are some topics that will be covered at ICCF9:** heat and related products; nuclear processes and transmutations; materials; innovative approaches; and theories.

**The Conference will consist of oral and poster presentations. The official language of the Conference will be English.**

**Pre-registration, registration, and submission of abstracts should preferably be performed using the Conference website, which will be updated regularly, and will provide all necessary information and interactive procedures. Those who do not have access to the Internet are kindly requested to contact any one of the Conference Secretariats.**

**Conference Secretariat Chairperson:** Jian Tian
**ICCF9 Secretariat:** Ge Zhao, Ming Yuan Mei, Jing Chen

Department of Physics, Tsinghua University, Beijing 100084 China;
Phone: (86)-10-6278-4343; Fax: (86)-10-6278-4343; Email: iccf9@tsinghua.edu.cn

**The International Advisory Committee consists of:** Honorary Chairpersons Neng K. Cheng (China) and Qing Q. Gou (China); and the Chairperson, Xing Z. Li (China).

**Conference Committee Members are:** J.P. Biberian, France; T. Bressani, Italy; H. Ikegami, Japan; Y. Iwamura, Japan; F. Jaeger, USA; J. Kasagi, Japan; X.Z. Li, China; M. McKubre, USA; G. Miley, USA; K. Ota, Japan; N. Samsonenko, Russia; C. Sanchez-Lopez, Spain; F. Scaramuzzi, Italy; M. Srinivasan, India, and A. Takahashi, Japan.

**The Scientific Program Committee Honarary Chairpersons are:** Li M. Yang and Yi B. Fu. The Scientific Chairperson is Xing Z. Li.

**Committee Members are:** Dong X. Cao; Yan Deng; Jing T. He; Xing L. Jiang; Run B. Lu; Bing R. Shi; Jian Tian; Zhong Q. Tian; Zhi W. Yu; Wei Z. Yu; Zhong L. Zhang; Xing W. Zhang, and Rui Zhou.

**Watch the ICCF9 website for updated information as it becomes available.**

http://iccf9.global.tsinghua.edu.cn

New Energy Times Archive

# The Experiments of **Dayton C. Miller** (1925-1926) and the **Theory of Relativity**

*Reprinted with permission from 21st Century Science & Technology, Spring 1998.*

—Maurice Allais

Einstein's theories of special and general relativity rest on the allegedly null results of Michelson's interferometer experiment. Here, a French physicist and Nobel Laureate in economics, demonstrates that Michelson's results were not null, and that the interferometer experiments of the American scientist Dayton Miller produced positive results, thereby invalidating the foundation of the Theory of Relativity.

### 1. The Genesis of the Theory of Relativity

In 1900, it was considered, as "well-established," that all attempts to detect, by purely terrestrial experiments, the motion of translation of the Earth had failed.

To explain this negative outcome, Lorentz presented his hypotheses of the contraction of bodies according to their velocities and the local time, and, following Lorentz, Einstein developed his Special Theory of Relativity (1905), and subsequently, his General Theory of Relativity (1916).

From the formulation of the Special Theory of Relativity stem both the impossibility of detecting the Earth's motion in its orbit, and the invariance of the velocity of light in all directions.

Today, it is everywhere admitted without reservation, *as postulates*, that the velocity of light is independent of its direction, and that no *purely terrestrial* experiment can detect the velocity of translation of the Earth, or even simply its position in its orbit.

**Table 1**
**OBSERVATIONS OF MILLER: SINUSOIDAL FITTINGS WITH A 24-HOUR PERIOD**

**Velocities**

| | R | $1-R^2$ |
|---|---|---|
| Feb. 8 | 0.361 | 0.869 |
| April 1 | 0.981 | 0.0377 |
| Aug. 1 | 0.882 | 0.223 |
| Sept. 15 | 0.854 | 0.271 |

**Azimuths**

| | R | $1-R^2$ |
|---|---|---|
| Feb. 8 | 0.856 | 0.267 |
| April 1 | 0.939 | 0.118 |
| Aug. 1 | 0.970 | 0.0593 |
| Sept. 15 | 0.927 | 0.141 |

**Estimations of $\theta^*$ and $\theta^{**}$ (in sidereal time)**

| | $\theta^*$ | $\theta^{**}$ | $\theta^{**}-\theta^*$ |
|---|---|---|---|
| Feb. 8 | 17.65 | 18.56 | 0.91 |
| April 1 | 14.55 | 15.48 | 0.93 |
| Aug. 1 | 16.50 | 15.83 | −0.67 |
| Sept. 15 | 17.59 | 17.78 | 0.29 |

R = correlation coefficient
$\theta^*$ = sidereal time of the velocity minimum
$\theta^{**}$ = sidereal time of the equality $A = \bar{A}$ with $dA/dt < 0$

Sources: Calculations of Figures 1 and 2. The correlations were calculated by this author in February 1996.

### 2. The Reputedly "Negative" Outcome of Michelson's Experiment and Miller's Experiments

The principle of Miller's experiments (Miller, 1933, pp. 203-242) is the same as for Michelson's experiments. According to this principle, the interferometer makes it possible to measure the difference of the velocity of the light for two perpendicular directions. In his 1933 paper, Miller presented his observations in the form of eight figures, four for the azimuths and four for the velocities, in sidereal time, for four periods of continued observations during six or eight days (Miller, 1933, p. 229).

Any appreciation of the scope of Miller's observations boils down to three utterly fundamental questions:

*First Question:* Do Miller's observations result from mere disturbances (of temperature, for example), or do they present a very real internal coherence?

*Second Question:* Do they permit us to detect variations in the velocity of light according to its direction?

*Third Question:* Is it possible to deduce the Earth's position in its orbit from these observations?

### 3. The Very Remarkable Coherence Underlying Miller's Observations Excludes Any Spurious Effect

A very marked coherence appears when one considers the variations in the azimuths and velocities, not in civil time, but in sidereal time.

New Energy Times Archive

Figures 1 and 2 represent the fittings, with sinusoids of a period of 24 hours, of the curves representing velocities and azimuths in sidereal time. They are on the whole very remarkable.

The sidereal time θ* for which the velocity is minimal, and the sidereal time θ** for which the azimuth A is equal to its $\bar{A}$ mean value, and for which $dA/dt < 0$, are very *similar* for the four considered periods (Table 1).

The top parts of Figures 3 and 4 represent the hodographs of velocities for the four periods on the basis of the hourly values of velocities and azimuths in sidereal time. [A hodograph is the curve traced out in the course of time by the tip of a vector representing some physical quantity.] On each graph the $\bar{A}$ mean value is represented.

It is remarkable that on the whole the figures representing the hodographs are approximately *perpendicular* to the directions of the $\bar{A}$ mean azimuths.

The bottom parts of Figures 3 and 4 represent the hodographs deduced from the sinusoidal fittings of the velocities and azimuths. For the four periods, the calculated hodographs are almost exactly perpendicular to the mean $\bar{A}$ directions of the azimuths and *symmetrical* relatively to those directions. Indeed that is an even more remarkable circumstance.

Finally, the figures change gradually from one period to another. They attain their maximum dimensions around September 21, which corresponds to the autumn equinox, and their minimum dimensions around March 21, corresponding to the spring equinox. They are therefore dependent on the Earth's position in its orbit.

All these properties, which indisputably correspond to a very marked coherence underlying Miller's observations, allow us to give an unquestionably affirmative answer to the first two fundamental ques-

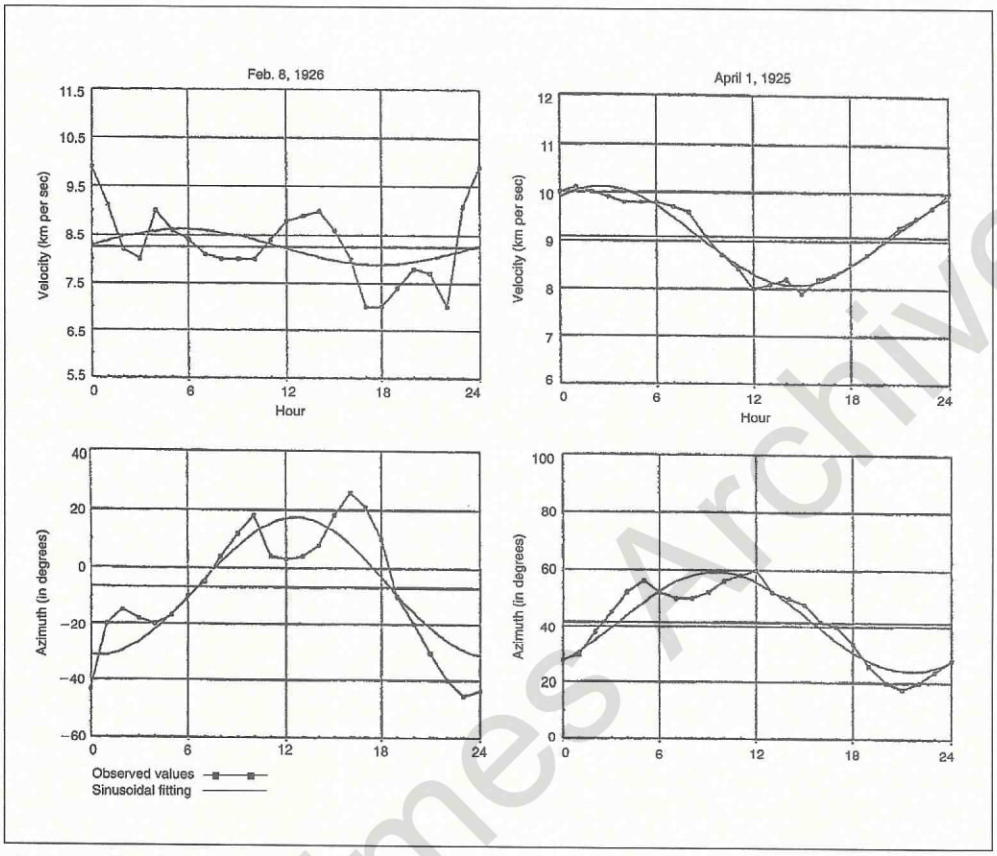



**Figure 1:** Hourly observations of Miller: Daily velocity and azimuth curves (in sidereal time). Sources: Hour-by-hour values of the running averages of Miller's figures (Miller 1933, p. 229). The fittings were calculated by this author in February 1996.

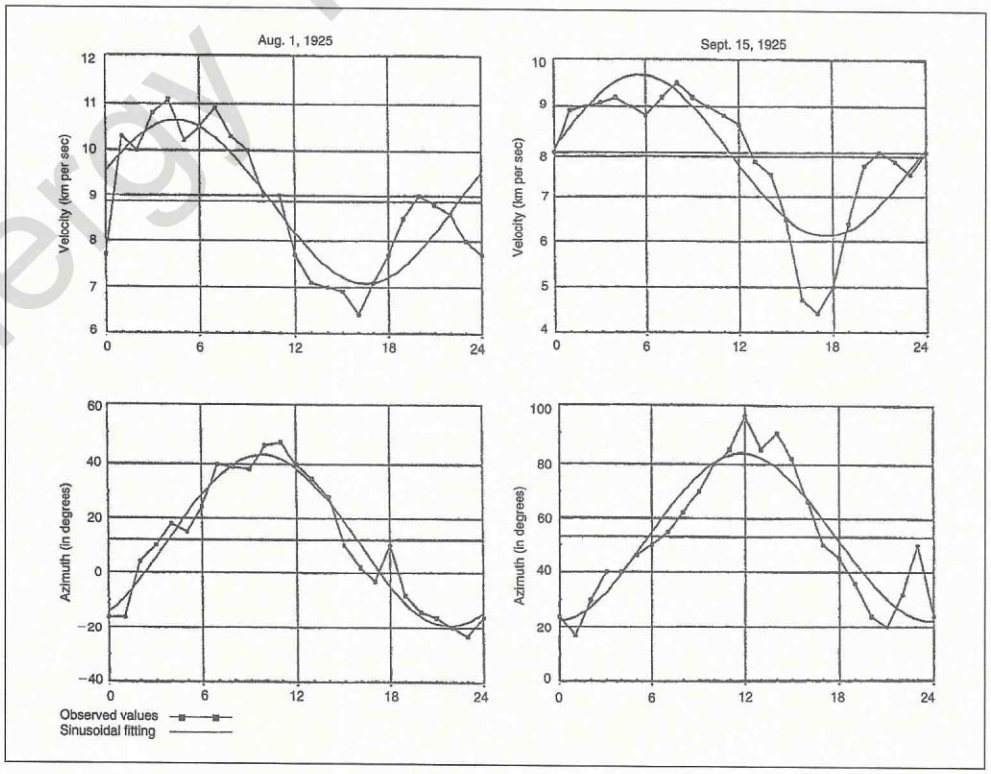



**Figure 2:** Hourly observations of Miller: Daily velocity and azimuth curves (in sidereal time). Sources: Hour-by-hour values of the running averages of Miller's figures (Miller 1933, p. 229). The fittings were calculated by this author in February 1996.

New Energy Times Archive

**Table 2**
**FUNDAMENTAL FIGURES OF MILLER: GRAPHICAL ESTIMATIONS OF VELOCITIES AND AZIMUTHS**

| | Velocities (in km per sec) | | | Azimuths (in degrees) | | | |
|---|---|---|---|---|---|---|---|
| | $V_M$ | $V_m$ | | $A_M$ | $A_m$ | $\bar{A}$ | $A^*_M$ |
| April 1, 1925 | 10 | 7.8 | April 1, 1925 | 60 | 20 | 40 | 20 |
| Aug. 1, 1925 | 11.6 | 6.5 | Aug. 1, 1925 | 45 | −20 | 12.5 | 32.5 |
| Sept. 15, 1925 | 9.8 | 4.2 | Sept. 15, 1925 | 90 | 20 | 55 | 35 |
| Feb. 8, 1926 | 10 | 7.3 | Feb. 8, 1926 | 15 | −40 | −12.5 | 27.5 |

$V_M$ and $V_m$: maximum and minimum values of velocities

$A_M$ and $A_m$: maximum and minimum values of azimuths

$\bar{A} = (A_M + A_m)/2$

$A^*_M = (A_M - A_m)/2$

$A^* = A - \bar{A}$

Source: These estimations of $V_M$, $V_m$, $A_M$, and $A_m$ were deduced *graphically* from photographic enlargements of Miller's figures (Miller 1933, p. 229), *independently of any hypothesis.* These estimations were made in June 1995, and have been used for all the calculations of Table 3.

tions of section (2) above.

It is therefore absolutely wrong to conclude that Michelson's experiment, as taken up by Miller, gives a negative outcome.

### 4. The Very Significant Correlation of Miller's Observations with the Earth's Position in Its Orbit

The most significant parameters characterizing Miller's eight fundamental figures are the maximum and minimum velocities $V_M$ and $V_m$, the $\bar{A}$ mean values of the A azimuths, and the amplitudes $A^*_M$ of their variations around their mean values.

Table 2 gives the direct estimations I made graphically of these parameters through the photographic enlargement of Miller's eight fundamental figures (original observations and running averages of Miller's figures), and that quite independently of any hypothesis or any theoretical interpretation whatsoever.

A thorough harmonic analysis of these parameters shows that *all* have a marked semi-annual or annual periodical structure. The maximum and minimum values of the corresponding sinusoidal fittings all occur around the March 21 equinox.

For lack of space, I must limit myself to commenting on the fittings of Table 3 of the observed data with sinusoids for a period of six or twelve months, all having their maximum on March 21.

Although each of the two groups of fittings corresponding to six- or twelve-month periods relates to only one reference sinusoid with a maximum on March 21, all the correlation coefficients are relatively high. They are all the more significant as the considered parameters do not correspond to isolated observations but to the averages of very numerous observations. The statistical significance of the whole of these results, for semi-annual or annual periods corresponding to fittings to the same functions, is very high, and amounts to a quasi-certainty.

Thus it may be considered as perfectly established that the observations corresponding to the four series of experiments have a semi-annual or annual periodicity centered on March 21, the date of the spring equinox, and that it is possible through purely terrestrial experiments to determine the Earth's position in its orbit.

An affirmative answer must therefore be given, in all certainty, to the third question of section (2) above.

**Table 3**
**OBSERVATIONS OF MILLER: SEMI-ANNUAL OR ANNUAL DOMINANT PERIODICITIES**

*Fittings to a sinusoid of a period of 6 or 12 months with its maximum on March 21.*

| Series | Period in months | Correlation coefficient (R) | $1-R^2$ |
|---|---|---|---|
| $V_M$ | 6 | − 0.772 | 0.404 |
| $(V_M + V_m)/2$ | 6 | − 0.607 | 0.632 |
| $\bar{A}$ | 6 | + 0.834 | 0.305 |
| $\bar{A} + A^*_M$ | 6 | + 0.744 | 0.447 |
| $\bar{A} - A^*_M$ | 6 | + 0.880 | 0.225 |
| **Averages:** | | $\lvert\bar{R}\rvert = 0.767$ | $\overline{1-R^2} = 0.403$ |
| $V_m$ | 12 | + 0.880 | 0.225 |
| $V_M - V_m$ | 12 | −0.9994 | 0.0012 |
| $V_m/V_M$ | 12 | + 0.980 | 0.041 |
| $A^*_M$ | 12 | −0.924 | 0.145 |
| **Averages:** | | $\lvert\bar{R}\rvert = 0.946$ | $\overline{1-R^2} = 0.103$ |
| **Overall averages:** | | $\lvert\bar{R}\rvert = 0.847$ | $\overline{1-R^2} = 0.269$ |

Source: Estimations of Table 2

### 5. Interpretation of Miller's Observations

The above analysis leads to a fourfold conclusion:

– First, there is a considerable and absolutely indisputable coherence between Miller's interferometric observations, and it corresponds to a very real phenomenon.

– Second, it is quite impossible to attribute this very marked coherence to fortuitous causes or to spurious effects (of temperature, for example).

– Third, the velocity of the light is not invariant in all directions.

– Fourth, all of Miller's observations display a very marked correlation with the Earth's position in its orbit.

These conclusions are independent of any hypothesis and of any theoretical analysis whatsoever.

Most of the results, on which these conclusions are founded, particularly the most significant ones, were not perceived by Miller.

On the basis of his own analysis, Miller considered it possible to provide an estimation of the cosmic velocity of the Earth in relation to its orbital velocity (Miller, 1933, pp. 230-237). However, Miller's analysis only considers the A - $\bar{A}$ differences, and does not provide any explanation for the mean deviations $\bar{A}$ of the azimuths and their variations from one period to another (Miller, 1933, pp. 234-235).

New Energy Times Archive

Consequently, the interpretation given by Miller to his observations cannot be considered as valid.

In fact, it is possible to show that the observed velocities and azimuths can be explained by the conjunction of two effects:

– an optical anisotropy of space in the direction $\bar{A}$;

– an effect proportional to the total velocity of the Earth (orbital velocity + cosmic velocity toward the Hercules constellation).

### 6. The Significance and Scope of Miller's Observations

The very basis of the Special and General Relativity Theory rests on a triple postulate: the reputedly "negative" result of Michelson's experiment; the invariance of the speed of light in all directions; and the impossibility of detecting the absolute motion of the Earth, through any purely terrestrial experiment.

However, with regard to the analysis above, it is certain that it is impossible to maintain that interferometric experiments provide a "negative" outcome, that the velocity of the light is invariant in all directions, and that any purely terrestrial experiment cannot determine the motion of translation of the Earth.

*Consequently, the Special and General Theory of Relativity, resting on postulates invalidated by the observation data, cannot be considered as scientifically valid.*

As Einstein himself wrote in 1925 in a review in *Science*: "If Dr. Miller's observations were confirmed, the Theory of Relativity would be at fault. Experience is the ultimate judge."

The "positive" outcome of Miller's experiments means that there is no distinction to be made between the rotation of the Earth and its translation as maintained by the Theory of Relativity. Both can be detected through purely terrestrial experiments.

Rejection of the Special and General Theory of Relativity as being incompatible with observational data cannot in any way mean that all of Einstein's contributions should be rejected. It means only that all theoretical developments based on data invalidated by experimental data should be discarded as such.

Those contributions of Einstein that

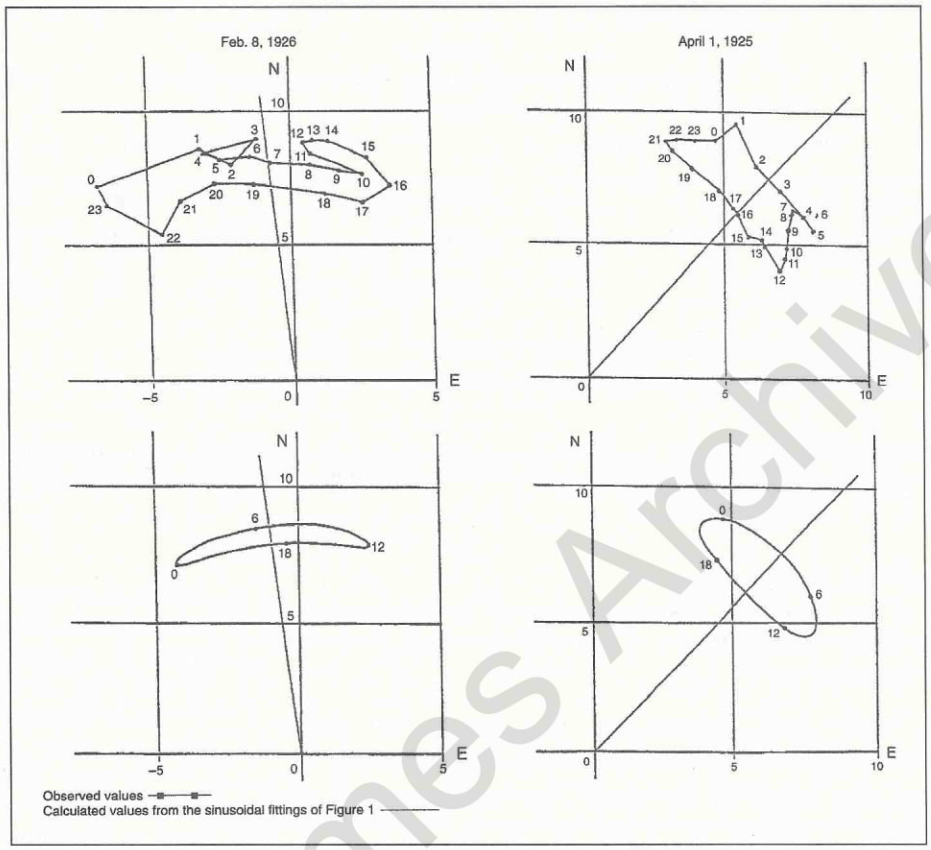



**Figure 3:** Observations of Miller: Observed hodographs of hourly values and calculated hodographs deduced from the fittings of velocities and azimuths. Source: Figure 1.

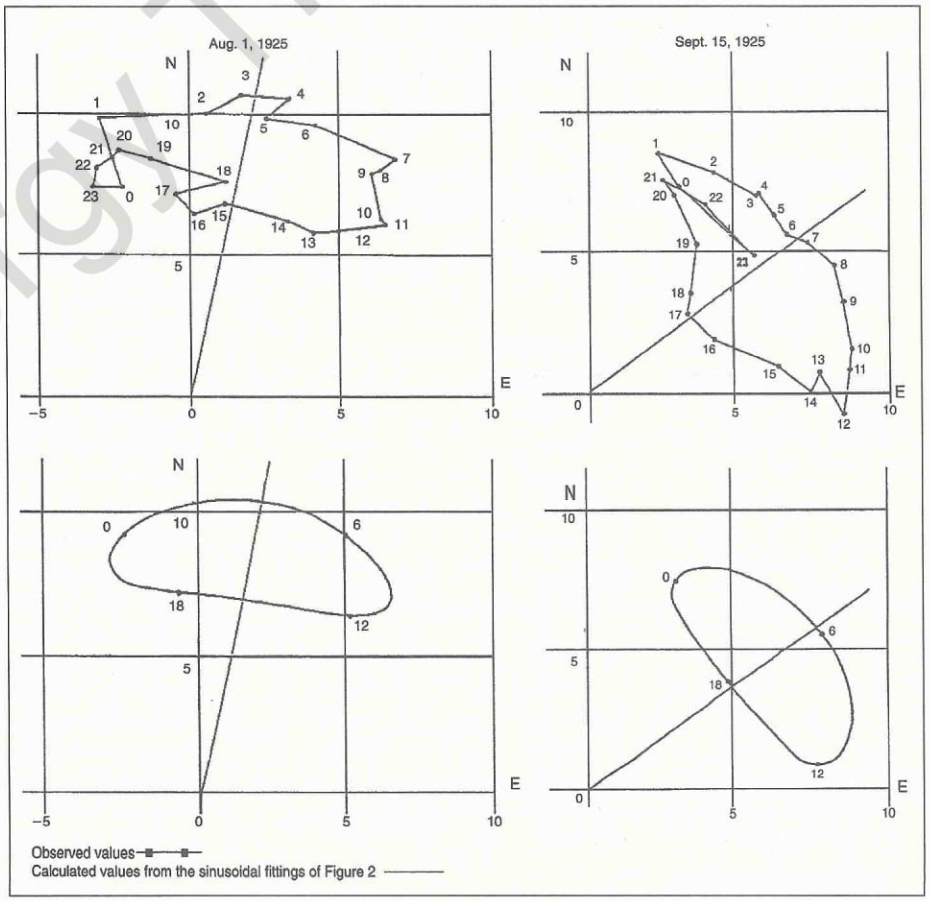



**Figure 4:** Observations of Miller: Observed hodographs of hourly values and calculated hodographs deduced from the fittings of velocities and azimuths. Source: Figure 2.

New Energy Times Archive

appear to have been confirmed by experience should naturally be preserved, but, quite obviously, they must be given a theoretical justification other than that of the Theory of Relativity.

*A theory is only worth what its premises are worth. If the premises are wrong, the theory has no real scientific value. Indeed, the only scientific criterion of the scientific validity of a theory is its confrontation with experimental data.*

**References**


— Allais, M. 1959. "Should the Laws of Gravitation be Reconsidered?" *AeroSpace Engineering,* September, No. 9, pp. 46-52; October, No. 10, pp. 51-55; November, No. 11, p. 55.

— Conference on the Michelson-Morley Experiment. 1927. February 4-5, *Astrophysical Journal,* Vol. 68, (December), pp. 341-402.

— Einstein, A. 1905. "Zur Elektrodynamik bewegter Korper," *Annalen der Physik*, Vol. 17, p. 891.

— Einstein, A. 1916. "Die Grundlage der Allgemeinen Relativistatstheorie," *Annalen der Physik*, Vol. 49, p. 765.

— Lorentz, H.A. 1895. "Versuch einer Theorie des Elektrischen und Optischen Erscheinungen in bewegter Körperm," in (Leiden): *Enzyklop. d. math. Wiss. V*, 1903, p. 2, Art. 14.

— Lorentz, H.A. 1904. "Electromagnetic Phenomena in a System Moving with Any Velocity Smaller Than That of Light," in *Koninklijke Akademie van Wetenschappen te Amsterdam, Proceedings of the Section of Sciences,* Vol. VI, p. 809.

— Michelson, A. 1881. "The Relative Motion of the Earth and the Luminiferous Aether," *The American Journal of Science,* Third Series, Vol. 22, Art. XXI, pp. 120-129.

— Michelson, A. and Gale, H. 1925. "The Effect of the Earth's Rotation on the Velocity of Light," *Astrophysical Journal*, April, pp. 137-145.

— Michelson, A. and Morley, E. 1887. "On the Relative Motion of the Earth and the Luminiferous Aether," *The American Journal of Science*, Third Series, Vol. 24, No. 203, Art. XXXVI, pp. 333-345.

— Miller, D.C. 1925. "The Ether-Drift Experiments at Mount Wilson," *Proceedings of the National Academy of Sciences*, Vol. 2, April, pp. 306-314.

— Miller, D.C. 1926. "Significance of the Ether-Drift Experiments of 1925 at Mount Wilson," *Science*, Vol. 63, No. 1635, April, pp. 433-443.

— Miller, D.C. 1933. "The Ether-Drift Experiment and the Determination of the Absolute Motion of the Earth," *Reviews of Modern Physics*, Vol. 5, No. 3, July, pp. 203-242.


## On My Experiments in Physics, 1952-1960

Editor's Note

From *21st Century Science and Technology*

These are excepts from an autobiographical essay that Allais completed in 1988, the year he received the Nobel Prize in Economic Science. The twenty-page essay, titled "My Life Philosophy," appeared in *The American Economist*, Vol. 33, No. 2, Fall 1989.

Allais was born in Paris in 1911, and graduated from the Ecole Polytechnique, first in his class in 1933. He began his professional career as an engineer in the national mining industry, simultaneously working on economics and history. From April 1948 on, he devoted his time to teaching, research, and writing, working in both physics and history. Although he retired in 1980, he has continued to work actively in all these areas.

Allais is the recipient of many awards, including fourteen scientific prizes. As he notes in his essay: ". . .Over the past fifty years, I have never stopped reflecting and working on the problems involved in the elaboration of a unified theory of physics."

• • • • • • •

Whatever the field of application, my whole life has been dominated by the thirst to know more, by the passion for research. I have felt this passion since my early youth; it has since formed the very foundation of my entire existence, and without any doubt, will remain so until the end. . .

Research is a sort of adventure full of risks, but a fascinating adventure. When a researcher undertakes some research, he is never sure of success. Very often he fails: reality is contrary to his expectations; and if he carries out an analysis and discovers some new regularity, what he finds is generally not exactly what he was seeking for. . .

In fact, there is hardly any greater satisfaction for the researcher than that which follows from the achievement of a vast synthesis between elements which at first seemed disparate or contradictory, or the display of new relationships between facts which seemed to have no connection, of regularities previously unrecognized, of invariant relationships in space and time. . .

### — The Origin of My Physics Experiments —

I believe it is very desirable to state explicitly what was the origin of all my experiments in physics.

I have always held the conviction that the propagation of the gravitational and electromagnetic actions implies the existence of an intermediate medium, the "ether" of Fresnel and the nineteenth century physicists, but without there being grounds to believe, as was generally considered in the nineteenth century, that all the parts of that medium are perfectly motionless in relation to fixed stars.

This conviction led me to consider that a magnetic field corresponds to a local rotation of this intermediate medium.

From this, I inferred that a link could be established between magnetism and gravitation by observing the effect of a magnetic field on the movement of a pendulum consisting of a glass ball suspended on a thread of a length of approximately 2 meters.

In order to detect such an effect I began by observing the movement of such a pendulum in the absence of any magnetic field other than that of the Earth. To my great surprise, I found out that this movement did not reduce itself to the Foucault effect, but displayed very significant anomalies in relation to this effect. It was these totally unexpected anomalies which made up the essential object of my experiments from 1953 to 1960.

Of all the very limited number of observations made in 1952 and 1953 of the movement of a glass ball oscillating in a magnetic field of the order of a few hundred gauss, I was not able to draw any definitive conclusion. With certain

New Energy Times Archive

experimental devices, I found positive effects, while with others, I obtained no effect whatsoever.

However great, indeed very crucial, the importance of these experiments, I was led, given the difficulties to realize a much stronger magnetic field, to interrupt them in order to devote all the resources at my disposal to the study of the anomalies in the movement of a short pendulum, the existence of which had been demonstrated indisputably in 1952 and 1953.

### — Paraconical Pendulum Experiments —

In order to study the anomalies detected in the movement of a short pendulum, I made use mainly of a paraconical pendulum, approximately 1 meter in length, consisting of a vertical bronze disc attached to a bronze rod suspended from a stirrup resting on a steel ball.

Indeed, outside any magnetic field other than the Earth's magnetic field, I observed, on the basis of uninterrupted observations realized over periods of a month between 1954 and 1960, very remarkable anomalies in the movement of the paraconical pendulum. A key finding was the existence of a significant periodicity of the order of 24h 50 min.

Identical results were found in June and July 1958 in two laboratories some 6 km away from each other, one in a basement at Saint-Germain, the other in an underground quarry at Bougival, 57 meters below ground.

Indeed, such a periodic lunisolar effect is quite inexplicable within the framework of the currently accepted theories.

### — Optical Sightings —

The existence of the anomalies observed in the precision levelling and triangulation operations, compared with the anomalies observed in the movement of the paraconical pendulum, led me to realize, in parallel with my pendulum experiments at Saint-Germain and Bougival in 1958, a series of North-South and South-North optical sightings on fixed sighting-marks. As a result of technical difficulties, it was not possible to realize these optical sightings satisfactorily until the second half of July 1958.

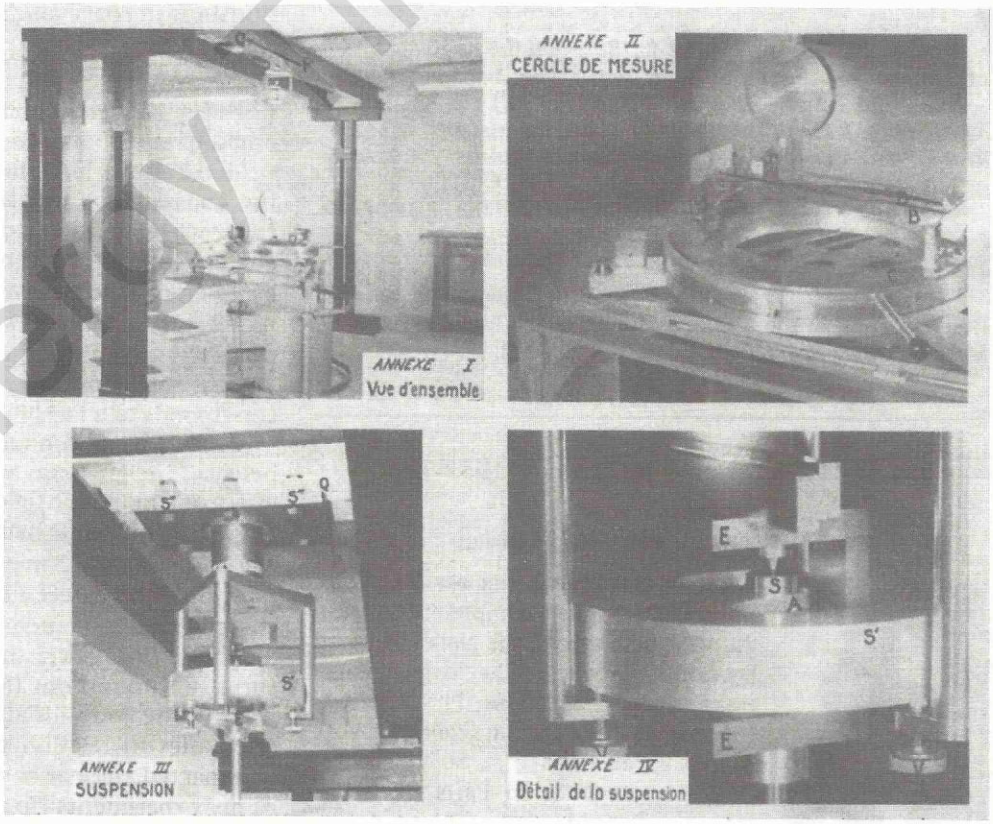
Indeed, I found, in the second half of July 1958, a remarkable correspondence between the anomalies of the paraconical pendulum and the anomalies corresponding to reciprocal optical sightings of two theodolites on two sighting-marks borne on the same supports as the theodolites. In any case, these optical anomalies, considered in themselves, are inexplicable within the framework of the currently accepted theories.

### — Effects of the Total Eclipse —

Finally, during the total eclipse of the Sun on June 30, 1954, a remarkable deviation of the plane of oscillation of the paraconical pendulum was observed. This deviation is quite inexplicable within the framework of the currently accepted theories. An entirely similar deviation was observed once again during the total eclipse of the Sun on October 2, 1959.

These various anomalies appeared to me to be closely connected to the very many anomalies observed during the nineteenth and twentieth centuries in mechanical, optical, and electromagnetic experiments, which have remained unexplained, and of which I presented an overall analysis in a paper in 1958 (published in English in 1959).

To conclude this very brief survey of my experiments, I believe I can make a prediction. If, without interruption, for at least a month, at the same place and simultaneously, observations were made of the movement of the paraconical pendulum, together with optical sightings such as those I made in 1958, and a repetition of the experiments of Michelson-Morley (1887) and Miller (1925), the purpose of which was to display the movement of the Earth relatively to the ether, it would be found that the effects observed by Miller in 1925 correspond to the anomalies of the movement of the paraconical pendulum and the anomalies of the optical sightings observed in July 1958. ❑❑❑




The paraconical pendulum used by Allais. Clockwise from top left: the entire apparatus; the measuring device; a closeup of the suspension; and the suspension system. Small ball bearing at S supports weight of pendulum.

New Energy Times Archive

Device and Testing continued from page 51

39 kHz drive signal. The original piezos were mounted in a reactor composed of three plates of acrylic in order to look for proper cavitation and resultant sonofusion at atmospheric pressure and to measure that resonant frequency, believed to be close to the original resonance. See Photo 3. No excess heat was found and the resonance was 43 kHz. We had to cut the oscillator circuit board in half to make it fit inside the SEC; perhaps this has shifted the drive frequency. Crest has not yet responded to our inquiry about the factory set frequency.

Another permutation of the calorimetry we are trying is to keep the electronics outside of the SEC and to directly measure the ultrasonic electrical power going into the piezoelectric transducers. This is difficult to do accurately, and is the reason Roger selected a separate calorimeter for the electronics, which subtracted the heat dissipated from the electrical power drawn from the 120 VAC 60 Hz line source input to the oscillator. The result, by conservation of energy, is the ultrasonic power delivered to the reactor. Chris Eddy of Pioneer Microsystems has custom manufactured two single-channel, second generation ultrasonic watt meters for us. We will report the results of that testing when it has been completed.

There is a resistor bank and a small DC fan attached to the oscillator inside the SEC so that the SEC can be calibrated. See Photo 4. The new reactor has allowed us to insert a teflon plug in place of water between the piezo assemblies for further calibration, with or without the oscillator inside the SEC. The plastic plug absorbs vibrational energy as heat and makes for a very good joule heat calibration via the ultrasonic electrical input. The ultrasonic watt meters can be very accurately calibrated this way. The calibrated heat release inside the reactor also provides assurance that spacial location inside the SEC is not a problem; the fan helps reduce this minor influence even more. Excellent calibration errors of about 0.1 watt have been obtained with these methods. ■■■


**COLD FUSION TIMES**

**The Journal of the Scientific Aspects of Loading Isotopic Fuels Into Materials**

Published Quarterly • Publisher and Editor, Dr. Mitchell Swartz

Annual Subscription Rate $120/Single Issues $40
Outside U.S. add extra $5.

P.O. Box 81135, Wellesley Hills, MA 02181 USA


## Errata for *IE* No. 38

Last issue's report on DW Energy Research, LLC (page 18) incorrectly stated that "38,000 calories per gram equates to approximately 150 BTU/ounce of gas." The correct figure should have been 150 BTU/gram of gas.


**The Planetary Association for Clean Energy, Inc.**

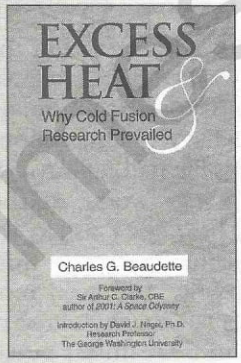
**A collaborative network of advanced scientific thinking since 1975.**

The Planetary Association for Clean Energy, Inc.
100 Bronson Avenue, Suite 1001
Ottawa, Ontario K1R 6G8, Canada
(613) 236-6265 • Fax: (613) 235-5876
E-mail: pacenet@canada.com
http://pacenet.homestead.com

• Brown's Gas • advanced therapeutics • consciousness studies • electromagnetic field bioeffects • free energy devices • human rights of scientists • legacy of Nikola Tesla • nuclear and toxic waste decontamination • scalars and the fundamentals of physics

Sample copy of our Newsletter containing book, video, software & CD-ROM list.






Published April 2000
Oak Grove Press
386 pp.Hardcover:

$39.95 North America
$46.95 Foreign

Paperback:
$29.95 North America
$34.95 Foreign
(Prices Include Postage)

Infinite Energy Press • P.O. Box 2816
Concord, NH 03302-2816

Phone: 603-228-4516 Fax: 603-224-5975
http://www.infinite-energy.com

"*Excess Heat* is a monumental work of scholarship and a great step to bring this very important new phenomenon into the mainstream of science."

—Dr. John O'M. Bockris

**EXOTIC RESEARCH REPORT**

21st Century • Energy Technology
Alternative Medicine • Latest Inventions

U.S. $30 • Can/Mex. $35 • Foreign: $55
Exotic Research • P.O. Box 411 • Stanfield, AZ 85272
1-800-417-6399


New Energy Times Archive

# Einstein Superstar

Rory Johnston*

**Abstract**

*Einstein has long been a favorite subject for the media. Their presentations of his ideas to the general public are, however, invariably nonsense, replete with illogicalities and wrong science. The result is to undermine the standing of science as a rational activity that can be understood and overseen by the public. The implications for democracy in our increasingly science-oriented world are profound.*

Once when Einstein had to fill out some form that asked his profession, he wrote "photographer's model." Portraitists constantly pestered him not just because he looked exactly like what a scientist should look like. The story of his work and his life had captured the imagination of the whole of the literate world, as they continue to do today. Everyone has heard of Einstein and everyone knows he is important. But the remarkable thing is that hardly anyone can tell you why. And even more remarkable, over the years, the media has eagerly seized on Einstein as a story to be explained to a breathless public, and without exception they have failed.

In December of 1999 after much trumpeting, *Time* magazine named Einstein "Person of the Century."[1] To make it all clear to their readers, *Time's* editors enlisted the world's most recognizable physicist, Stephen Hawking. A highly intelligent non-scientist friend of mine read Hawking's words and at the end said, "I'm so stupid. I don't understand this at all." Well, no, she is not stupid. What Hawking wrote did not make sense. He simply joined a long line of authors, television producers, journalists, and scientists themselves who have set out to explain Einstein and ended up saying things like "Cats die. Socrates is dead. Therefore Socrates is a cat."

The mystery is why the critical faculties and capacity for rational thinking of otherwise intelligent writers and editors seem to evaporate when faced with the man with the freaky white hair. Now after nearly a century his ideas are not even new. This is not an inconsequential mystery. The enormous authority that science has acquired in our society has to be testable. Citizens must be able to confirm for themselves that what the scientists say is true. If the science is gobbledygook, how can they?

The nonsense that the books and TV programs generate falls into distinct patterns. First, many start out with the assertion that "All motion is relative. There is no fixed point in the universe from which to measure absolute motion." That seems a reasonable though not self-evident proposition. But then a few pages later they say, "Nothing can move faster than the speed of light," which is an absolute statement about speed and therefore meaningless in light of the previous assertion. "Relative to what?" is the obvious question that they overlook. The correct answer ("relative to *any* observer") leads us into a bizarre and baffling world.

The next common pitfall concerns the constancy of the speed of light. Measurements of the speed of light, we are told, are unaffected by any relative motion between the source of the light and the receiver. How can this strange claim be substantiated? The Michelson-Morley experiment is described in detail. Michelson and Morley, it says, set out to detect the aether drift and found none. (Actually they *did* find an aether drift,[2] but let's not complicate this even more!) The absence of a drift shows the speed of light is a constant. But no, it does not! In the Michelson-Morley experiment, the source and the receiver of the light are both bolted onto a large stone table, and are not in relative motion.

Some books give us variations on these themes. *The Universe and Dr. Einstein* by Lincoln Barnett, published in 1948, bears the imprimatur of a foreword by Einstein himself. Barnett was a reporter for *Life* magazine. Rather than saying that the Michelson-Morley result proves the constancy of *c*, he presents Einstein's theory as an explanation of the missing aether drift. Then he says that Einstein dispenses with the aether altogether.[3] But if there is no aether, we would not expect there to be an aether drift. The puzzle disappears in a flash! Why bother with contractions and time dilation?

Robert March in *Physics for Poets* confuses this even more by making the odd claim, without justification, that there would be an aether drift even if there were no aether.[4]

Martin Gardner in his classic *Relativity for the Million*, now republished as *Relativity Simply Explained*, says, "If there is no way to measure uniform motion relative to a universal, fixed frame of reference like the ether, then light must behave in an utterly fantastic way," *i.e.* its speed must be constant.[5] But this does not follow. Then some chapters later, to explain the Twin Paradox, he says that, "The stay-at-home does not move relative to the universe."[6] But he has already said there is no such thing as motion relative to anything "universal"!

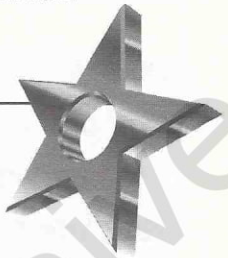
A recent book by David Bodanis[7] includes the obligatory political correctness and lots of life-story stuff that is supposed to make science palatable to the non-scientist. To demonstrate why *c* must be constant, he pictures a surfer riding a wave—the wave to the surfer appears to be stationary. A light wave cannot be like that, he says, because it can only exist by constantly moving forward.[8] But that is true of any wave!

Some writers aim to present what the problem was that



New Energy Times Archive

***Time magazine's justification for its anointing of Einstein is that he transformed our universe and the way we think about it. But did he really? . . . Do people now think in Einsteinian terms? "As I drive down the freeway my car gets slightly smaller." Of course not.***



launched Einstein on his work. What was wrong with the picture of the world offered by classical physics? Nigel Calder wrote the script for "Einstein's Universe," a weighty BBC TV documentary for the great man's centennial in 1979. He points out that the Earth circling the Sun possesses immense kinetic energy if you look at it from the point of view of an astronaut hovering far out in space, but none if you are stationary with respect to the Earth.[9] Both cannot be correct, he says. But this is not a problem. Remember the calculations of potential energy we did in high school. If you lift a weight up, you give it so much potential energy. But what happens if you dig a hole under it? Has the potential energy magically increased? It doesn't matter. Using a consistent point of view, the math always comes out right and energy is conserved. Calder then goes on to repeat the blunder about Michelson and Morley proving the constancy of *c*.[10]

It is not surprising that Einstein himself does not make this mistake. Einstein was a clever man. In his *Relativity: The Special and General Theory,* first published in 1916, he points to de Sitter's observations of double stars as his reason for saying the speed of light is constant.[11] As it happens, the constancy of *c* does not follow from de Sitter's results alone, but taken together with the (supposed) Michelson-Morley missing aether drift, maybe it does. One might suppose there could be a simpler explanation of de Sitter's results[12] than the colossal edifice of relativity—they were, incidentally, disputed[13]—until one notices a more immediate difficulty to do with dates. Einstein first published his theory in 1905. De Sitter made his observations in 1912. Was Einstein clairvoyant?

Hawking in *Time* seems to deduce the constancy of *c* from Michelson and Morley: "It was as if light always traveled at the same speed relative to you, no matter how you were moving."[14] He goes on to dispense with the aether, and then repeats an oft-heard assertion, that for the laws of physics to be the same for all observers, they must all measure the same value for *c*. Why so? The parameters of physics change even as the laws stay the same. The boiling point of water is lower at the top of Pike's Peak than in Malibu. All this on Hawking's first page. No wonder my friend was confused.

Einstein is not alone as an inspiration of scientific misinformation. Much of modern physics has the same effect. Gary Zukav's celebrated book *The Dancing Wu Li Masters* amongst plenty of other nonsense proves (fallaciously) from the experiment with three crossed polaroids that not only is traditional physics obsolete but traditional logic is as well.[15] In *The End of Time,* Julian Barbour starts propounding his theories by explaining the difference between solar time and sidereal time.[16] But he gets it wrong. I still remember some of what I learnt in Astronomy 101 at MIT.

While many of the implications of relativity and quantum theory are too abstruse for the outsider to appreciate substantially, the topic of quantum computing would seem to entail tangible results that we could see and be sure of. We are told the CIA is losing sleep over the possibility that its most secret codes could be cracked. *The Feynman Processor* is by Gerard Milburn of the University of Queensland, one of the leading researchers in quantum computing.[17] On page 67 he says, "Photons have another property, polarisation . . ." On page 35 he says, "Photon polarisation. . .cannot be regarded as a property of a photon. . ." One wonders whether he gives Fs to students who write stuff like that. Many of his other errors read like students' blunders.

TV producers are apt to tell me when faced with these criticisms that they have to cut corners. No popular treatment can deal with every minutia. But I am not talking about minutiae. I am talking about the whole point. If one disagrees with the third verse of a poem, one can go on to enjoy verses four, five, and six. But the nature of scientific reasoning is that it is sequential. "If this, then this, then this, then that. . ." If one link in this chain does not hold, then the whole of the remainder is worthless. And if the reader/viewer cannot follow the reasoning, it changes the whole nature of the discourse. We are back to the days of a priesthood, scientists now rather than clergy, who say, "You can't understand this, you have to believe me." So if they can't understand, why bother to explain?

*Time* magazine's justification for its anointing of Einstein is that he transformed our universe and the way we think about it. But did he really? Certainly Newton changed the way we look at the world. The picture of the universe as a piece of clockwork is due to him—no longer did there have to be a supernatural force pushing the Sun across the sky. Do people now think in Einsteinian terms? "As I drive down the freeway my car gets slightly smaller." Of course not. The science that engineers and car mechanics and high school students use is still Newtonian. Einstein's analysis of quantum photoelectric effects has no bearing on the practical use of photocells. Lasers are useful, but they have not fundamentally changed our world. Nuclear weapons have thankfully not been used for over half a century, and nuclear power is on the wane (although of course if cold fusion becomes practicable, that will change).

Even in atomic physics Einstein can be in the back seat. Stephen Leacock once asked Ernest Rutherford what he thought of Einstein's relativity. "Oh, that stuff!" Rutherford replied. "We never bother with that in our work!"[18]

Nevertheless, Einstein has arrived and nothing I say is going to stem the tide of drivel. It is often said that relativity is quite simple. Professor Sir Sam Edwards, the former chairman of Britain's Science Research Council, once said to me, "You can

New Energy Times Archive

**How do we decide whom to believe? Maybe the cloud of unknowing over modern physics will lead people to question their absolute faith in science as the answer to everything. That must be a good thing.**

explain relativity to sixth-formers" (high school seniors). But the moral of all I have shown is that it is not simple. I have a rather naughty game I play with young physics majors I meet. I ask them if they have encountered the assertion that *c* is a constant. They say yes. I ask if they believe it is true. They say yes.

I ask, "Why do you believe it is true?"

At this point the intelligent ones say, "I don't know. I just plug the figures into the formula, get the right answer and pass the exam. I don't *understand* it."

The less intelligent ones start to explain to me about the Michelson-Morley experiment, until I point out the problem. Then they say, "I hadn't thought of that."

Richard Feynman said, "I think I can safely say that nobody understands quantum mechanics."[19] And no one understands relativity. Does it matter? Yes. It raises a major social problem. The scientific revolution of the seventeenth and eighteenth centuries brought about a fundamental shift in power amongst people. No longer did the mass of humanity have to sit open-mouthed before the priests and receive all truth from them unquestioned. Anyone claiming insight into something had to convince us. The motto of the Royal Society, founded in 1660, was and is *Nullius in Verba*, which is best translated "Take nobody's word for it."

With Einstein all that is changed, and the new priesthood is as fallible as its predecessors. But science has acquired limitless authority in our society. So many political arguments lead to the assertion, "Studies show that. . ." How do we decide whom to believe? Maybe the cloud of unknowing over modern physics will lead people to question their absolute faith in science as the answer to everything. That must be a good thing.

In the meantime recall Sir John Squire's continuation of Pope:

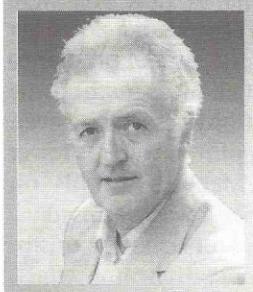
> Nature, and Nature's laws lay hid in night.
> God said, Let Newton be! and all was light.
>
> It did not last: the Devil howling "Ho!
> Let Einstein be!" restored the status quo.

Nancy Banks-Smith, TV critic of the British daily *The Guardian*, added yet another couplet in reviewing Nigel Calder's long program:[20]

> The BBC as things could be no worse
> Said let them sleep, show "Einstein's Universe."

**References**


1. Isaacson, W. 1999. "Writers for the Century," *Time*, December 31, p. 4.
2. Polanyi, M. 1958. *Personal Knowledge*, Routledge and Kegan Paul, London, pp. 12-13.
3. Barnett, L. 1948. *The Universe and Dr Einstein*, Morrow, New York, p. 38.
4. March, R.H. 1992. *Physics for Poets*, McGraw-Hill, New York, p. 95.
5. Gardner, M. 1997. *Relativity Simply Explained*, Dover Publications Inc., Mineola, New York, p. 32.
6. *Ibid.*, p. 114
7. Bodanis, D. 2000. *E=mc²: A Biography of the World's Most Famous Equation*, Walker, New York.
8. *Ibid.*, p. 49.
9. Calder, N. 1982. *Einstein's Universe*, Greenwich House, New York, p. 7.
10. *Ibid.*, p. 105.
11. Einstein, A. 1961. *Relativity: The Special and General Theory*, Crown, New York, p. 17.
12. de Sitter, W. 1913. "Constancy of the Velocity of Light," *Physikalische Zeitschriften*, 14, May 15, p. 429.
13. Freundlich, E. 1913. "Constancy of the Velocity of Light," *Physikalische Zeitschriften*, 14, September 1, 835-838. Et seq.
14. Hawking, S. 1999. "A Brief History of Relativity," *Time*, December 31, p. 67.
15. Zukav, G. 1980. *The Dancing Wu Li Masters*, Fontana, London, p. 278.
16. Barbour, J. 2000. *The End of Time*, Oxford University Press, Oxford, p. 98.
17. Milburn, G. 1998. *The Feynman Processor*, Perseus Books, Cambridge, Mass.
18. Leacock, S. 1945. "Common Sense and the Universe," in *Last Leaves*, Dodd, Mead & Co., New York, p. 43.
19. Feynman, R. 1967. *The Character of Physical Law*, MIT Press, Cambridge, Mass., p. 129.
20. Banks-Smith, N. 1979. "Einstein's Universe," *Guardian*, March 15.


**About the Author**

Rory Johnston is a science and technology writer based in Los Angeles. He reports for BBC World Service Radio, BBC Radio 4, and KWVE-FM. His writing has appeared in *New Scientist, The Times, The Guardian, Vogue, Sunday Times, Irish Times, The Age* (Melbourne), and many other publications; he has appeared on BBC TV, Thames TV, Telewizja Polska, etc. His book *The Knowledge Machine*, in collaboration with Prof. Donald Michie, has been published by Morrow and Viking/Penguin and in eight foreign translations.

*E-mail: roryj@compuserve.com


Copyright © 2001 Rory Johnston

New Energy Times Archive

# Why GALILEAN MECHANICS Is Not Equivalent To NEWTONIAN MECHANICS

Patrick Cornille*

*In this paper, we examine the difference between Newtonian and Galilean mechanics. We show that both the relativity and covariance principles result from the negation of Newton's third law in Galilean mechanics. We show that Galilean mechanics can be reconciled with Newtonian mechanics only if the rest reference frame has an infinite mass, which is the definition of an inertial reference frame.*

## 1. Introduction

We will demonstrate in this paper that Newtonian and Galilean mechanics are not equivalent if the mass of the reference frame tied to a particle is finite. The problem of the definition of a reference frame in both classical and relativistic mechanics is a difficult one, because this reference frame is usually considered by some physicists as a mere geometrical set of coordinates without any mass. The problem becomes more complicated if this reference frame is a so-called inertial frame. However, we will show that all these difficulties disappear in Newtonian mechanics as soon as the origin of a reference frame is located at the center of mass of a point particle and if one assumes that this reference frame is tied to the particle and has therefore the mass of the particle. Sometimes, one speaks about comoving frames to make the distinction between an inertial frame moving uniformly and a comoving reference frame attached to an object which undergoes acceleration. We will show in this paper that such a distinction is not necessary. This is an important point, since the concept of reciprocity of two reference frames in relative motion is introduced by some physicists as a concept which only applies to two inertial frames in both classical and relativistic mechanics, but certainly not to accelerated frames. This is not true. Anybody can check in books dealing with classical mechanics that reciprocity is linked to Newton's third law and to reference frames that are not inertial frames. This is a fact which is well-proved in the Mössbauer effect, where atomic or nuclear recoil in photon emission is cancelled by embedding the atoms in a rigid crystalline lattice. We will also discuss the reciprocity concept in relativistic mechanics and show that this concept has nothing to do with the simultaneity effect or with the finite speed of light. Therefore, this paper will tackle four main points: The mass of a reference frame, the reciprocity of two reference frames, the covariance principle, and the question of whether or not Newton's third law is compatible with a finite propagation of the speed of light.

To understand the discrepancy between Newtonian and Galilean mechanics from a mathematical point of view, one must review Newton's third law, since the contradiction results from the fact that Galilean mechanics does not recognize the existence of Newton's third law and therefore the covariance principle was used to serve as a substitute for Newton's third law. We will show that the contradiction disappears when the particle attached to the reference frame has an infinite mass. This is a necessary condition, which was already stated by Brillouin in his book[1] when he pointed out the necessity for an inertial frame to have an infinite mass. However, Brillouin was unable to back up his assertion with a mathematical demonstration. To our knowledge, the contradiction between the two mechanics has never been discussed before in the literature. Our approach is essentially a mathematical one, therefore we are compelled to accept the physical implications of the theory unless we want to depart from mathematical rigor and logic. This is a point which must be stressed from the outset, since the implications are not the ones the physicists are used to.

Quite often Newton's third law is brushed aside as a minor principle which only applies to classical mechanics. This is not true; on the contrary, this principle is the most important principle in Physics. This principle is fundamental for the understanding of Physics and is used in all branches of Physics, namely: classical and statistical mechanics, special relativity, electromagnetism, quantum mechanics, circuit and antenna theory, and plasma Physics. Until now, there has been no experimental evidence showing that Newton's third law has ever been violated in classical Physics for an observer located in a laboratory frame. However, in both classical Physics and in special relativity theory this principle is violated for different reasons.

The necessity of discussing Newton's third law cannot be avoided if one studies the relativity and covariance principle. For example, Speziale[2] recently published an excellent review paper on the principle of material frame-indifference. (Speziale never used, for good reason, the word covariance in his paper.) However, Newton's third law is never quoted or discussed in his paper. This is rather astounding for a review paper dealing with classical and statistical mechanics, which moreover quotes the books of Truesdell and co-workers.

**There is now both theoretical and experimental evidence[4-17] that the Ampère force does exist in the case of charges moving in conductors. In contrast, the Lorentz force law seems to apply very well for charges moving in the vacuum. These two forces laws are different, since the Ampère force follows Newton's third law while the Lorentz force does not.**



New Energy Times Archive

Newton's third law is currently used in all branches of Physics including statistical mechanics. A review paper[3] on the application of Newton's third law to electromagnetism, quantum mechanics, circuit and antenna theory has been published by the author. Therefore, the present paper deals with the application of this principle to classical mechanics and special relativity.

It is well-known that there exist two force laws for describing electromagnetic interactions: the better-known one is the Lorentz force law, describing interactions between free charges in a vacuum, and the older one is the Ampère force law, describing interactions between current elements confined in a metal. There is now both theoretical and experimental evidence[4-17] that the Ampère force does exist in the case of charges moving in conductors. In contrast, the Lorentz force law seems to apply very well for charges moving in the vacuum. These two forces laws are different, since the Ampère force follows Newton's third law while the Lorentz force does not. It is well-known that Newton's third law can be used to classify systems as closed or open depending on whether a force law follows or not Newton's third law. But the two laws are not equivalent, even when they are used for closed systems.[18] As demonstrated in our paper,[19] the open versus closed classification implies the existence of absolute and relative accelerations and velocities. That means that there are two kinds of quantities when the observer changes his reference frame: one whose magnitude changes with the change of reference frame and another one that does not change. We recall that the magnitudes of all quantities change in the special relativity theory when we change our reference frame.

It is often stated in the literature, for example in French,[20] that the equality of action and reaction has no place in relativistic mechanics. Newton's third law is also rejected on the ground that it implies action at a distance when we describe the mutual interaction of two charges. These explanations are invalid because each charge, located in the *same* reference frame, sends at the *same* retarded time $t_0$ a signal which will arrive at the position occupied by the other charge at time $t_0$ at the *same* time $t = t_0 + R/c$ where R is the distance between the two charges at the *same* time $t_0$ as shown in Figure 1. Then since the charges are moving, the signal will arrive at each particle sooner or later than t. For identical particles, the situation is totally symmetric if the force law is symmetrical.

The simultaneity and retardation effects have nothing to do with the fact that the mutual interaction does not follow the law of action and reaction. The failure of such an important law only resides in the *expression* of the force law itself. In fact, it has been shown by Moon and Spencer[9-14] and Wesley[21,22] that the Ampère force can be formulated with retardation effect, in that case Newton's third law is exactly verified.

## 2. Newton's Third Law in Classical Mechanics

### 2.1. Case of Two Particles

It is fundamental to recall some basic definitions in classical mechanics.[3,23-25] Newton's second law of motion states that the motion of two particles in a given reference frame is described by the differential equations:

$$\frac{d\mathbf{P}_1}{dt} = \mathbf{F}_{12} + \mathbf{F}_{11} \qquad \frac{d\mathbf{P}_2}{dt} = \mathbf{F}_{21} + \mathbf{F}_{22} \tag{1}$$

with the following definitions $\mathbf{P}_1 = m_1\mathbf{U}_1$ and $\mathbf{P}_2 = m_2\mathbf{U}_2$. We must distinguish between the internal forces $\mathbf{F}_{12}$ and $\mathbf{F}_{21}$ and the external forces $\mathbf{F}_{11}$ and $\mathbf{F}_{22}$ acting on the particles due to sources outside the system. We can speak of *mutual interaction* between two particles only if the internal forces follow Newton's third law, namely $\mathbf{F}_{12} = -\mathbf{F}_{21}$. Therefore, an external force is by definition a force that does not follow Newton's third law. When the external forces are zero, we say that the system is closed or isolated.

The center of mass of the system is a point $\mathbf{r}$ where the entire mass $m = m_1 + m_2$ of the system can be thought to be concentrated. It is defined by:

$$m\mathbf{r} = m_1\mathbf{r}_1 + m_2\mathbf{r}_2 \tag{2}$$

The motion of this point is only determined by the effect of external forces since we have:

$$\frac{d}{dt}m\mathbf{U} = \frac{d\mathbf{P}_1}{dt} + \frac{d\mathbf{P}_2}{dt} = \mathbf{F}_{11} + \mathbf{F}_{22} = \mathbf{F}_e \tag{3}$$

We can now study the motion of a second particle, called the relative particle, with a reduced mass $M = m_1m_2/(m_1 + m_2)$. This single particle is located at the place occupied by either the first or the second particle depending on our choice of the rest position, as shown in Figure 2. The distance $\mathbf{R}$ is therefore $\mathbf{R}_{12} = \mathbf{r}_1 - \mathbf{r}_2$ if particle 2 is located at the origin of a reference frame or $\mathbf{R}_{21} = \mathbf{r}_2 - \mathbf{r}_1$ if particle 1 is now the origin of our reference frame. For each choice, we have an equation of motion:

$$\frac{d}{dt}M\mathbf{V}_{12} = \mathbf{F}_{12} + \frac{1}{m}(m_2\mathbf{F}_{11} - m_1\mathbf{F}_{22}) = \mathbf{F}_i \tag{4}$$

$$\frac{d}{dt}M\mathbf{V}_{21} = \mathbf{F}_{21} - \frac{1}{m}(m_2\mathbf{F}_{11} - m_1\mathbf{F}_{22}) = -\mathbf{F}_i \tag{5}$$

where the relative velocity $\mathbf{V} = d\mathbf{R}/dt$ between the two reference frames is reciprocal, since we have $\mathbf{V}_{12} = -\mathbf{V}_{21}$. A physicist may argue that the reciprocity concept is purely kinematical and therefore follows directly from the equality $\mathbf{V}_{12} = -\mathbf{V}_{21} = -d\mathbf{R}_{21}/dt$ by definition. However, multiplying this equality by M and deriving the equality with respect

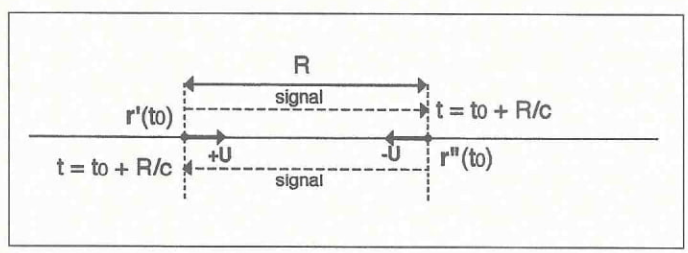



**Figure 1.** Electromagnetic interaction between two identical charges.

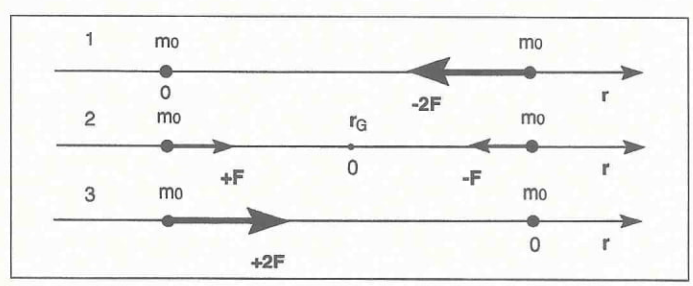



**Figure 2.** Three possible reference frames to describe the mutual interaction between two identical particles.



New Energy Times Archive

**Classical mechanics does not forbid the existence of the so-called free-energy devices or over-unity devices, provided they use forces that do not satisfy Newton's third law. In the case of an open system, the efficiency can be higher than 100% because the work of the external force is not taken into account. The only question to be answered is how do we generate an external force? Since the Lorentz force does not follow Newton's third law, this force can be used for building the so-called free-energy devices.[26]**

to time automatically leads to Equation 4 or 5. It follows that the reciprocity $V_{12} = -V_{21}$ of the rest reference frame is indeed linked to the existence of Newton's third law, as shown in Figure 2 for the three possibilities. The reciprocity concept and Newton's third law are two faces of the same coin. Therefore, we cannot use the reciprocity of the reference frames in special relativity and at the same time state that Newton's third law does not apply in special relativity. We will show hereafter the difference concerning the reciprocity concept between Newtonian and Galilean mechanics. Equations 4 and 5 imply both the covariance and the invariance of Newton's second law under a change of reference frame if the reference frames are reciprocal. This change of reference frame has nothing to do with a Galilean transformation, which will be discussed hereafter. Moreover, we note that the reference frame at rest is not necessarily an inertial frame.

Equations 3 to 5 are fundamental to answering the main argument raised against the principle of material frame indifference, stated by Speziale[2] as follows: "Constitutive equations represent material properties that arise from the effects of molecular interactions that are constrained by Newton's second law, which is frame dependent, and consequently, material frame indifference can never be correct in a precise sense."

There are indeed real reasons to question the general validity of material frame indifference if we only use Equation 1 instead of Equations 3 and 4,5. We note that the Equations 3 and 4,5 define two kinds of quantities $\mathbf{R},\mathbf{V},\mathbf{F}_i$ and $\mathbf{r}_i,\mathbf{U}_i,\mathbf{F}_{ii}$. For example, the vector $\mathbf{V}$ can be the relative velocity of two cars approaching or receding moving on a road located on the Earth while $\mathbf{U}$ is the velocity of each car defined with respect to a reference frame located in the Sun. If we now apply a Galilean transformation to the Equations 1, 3-5 these equations will be form invariant, *i.e.* covariant, with an essential difference, namely the quantities $\mathbf{R},\mathbf{V},\mathbf{F}_i$ are invariant, *i.e.* their numerical values do not change in a change of reference frame, while the numerical values of the quantities $\mathbf{r}_i,\mathbf{U}_i$ change. This is the first difference between Galilean mechanics (Equation 1) and Newtonian mechanics (Equations 3 to 5). There is a second difference which will be studied later, when we review the covariance and relativity principles.

We recall that the equation of conservation of energy must satisfy the identity:

$$\frac{d}{dt}\left(\frac{1}{2}m_1U_1^2\right) + \frac{d}{dt}\left(\frac{1}{2}m_2U_2^2\right) = \frac{d}{dt}\left(\frac{1}{2}mU^2\right) + \frac{d}{dt}\left(\frac{1}{2}MV_{12}^2\right) \qquad (6)$$

When the external forces are zero $F_{11} = F_{22} = 0$, the system is closed, in that case, we get:

$$\frac{d}{dt}m\mathbf{U} = \frac{d\mathbf{P}_1}{dt} + \frac{d\mathbf{P}_2}{dt} = \mathbf{F}_{12} + \mathbf{F}_{21} = 0 \qquad (7)$$

It follows that the velocity $\mathbf{U} = d\mathbf{r}/dt$ and the kinetic energy $E_K = mU^2/2$ of the center of mass are constant. Thus, Newton's third law can be interpreted as a law of momentum exchange. Hence, a failure of the third law would be a failure of momentum conservation. We must also point out that there is a Newton's third law for rotation, as shown in Figure 3 with a splitting between orbital and spin rotations.

If the external forces are zero and the internal force $\mathbf{F}_{12}$ is derivable from a potential function $E_P(\mathbf{R})$, the equation of motion for the reduced mass becomes:

$$\frac{d}{dt}M\mathbf{V} = -\nabla_R E_P(\mathbf{R}) \qquad (8)$$

One can multiply the two sides of the above equation by $\mathbf{V}$ to obtain:

$$\frac{d}{dt}\left(\frac{1}{2}M\mathbf{V}^2 + E_P\right) = 0 \qquad (9)$$

Therefore, we have conservation of mechanical energy only in the case where the internal forces are central and satisfy Newton's third law for translation. As an example, let us consider the case of a simple non-relativistic harmonic oscillator of mass $m_1$ and spring constant $k_0$ fixed to a wall of mass $m_2 >> m_1$. The equation of motion for the displacement of the mass is:

$$M\frac{d^2\mathbf{R}}{dt^2} = -\nabla_R E_P \qquad (10)$$

where the internal force derives from a potential $E_P[\mathbf{R}(t)] = k_0\mathbf{R}^2/2$. Since $k_0$ is constant, the potential does not depend explicitly on time, therefore the system is closed and the mechanical or total energy $E_T$ is also constant:

$$E_T = \frac{1}{2}M\mathbf{V}^2 + \frac{1}{2}k_0\mathbf{R}^2 = Ct \qquad (11)$$

with the approximation $\mathbf{M} \approx m_1$.

The above discussion is not trivial since most physicists write the law of conservation of energy (11) with $m_1$ instead of $\mathbf{M}$. The splitting between internal and external forces is independent of the origin of the force, and

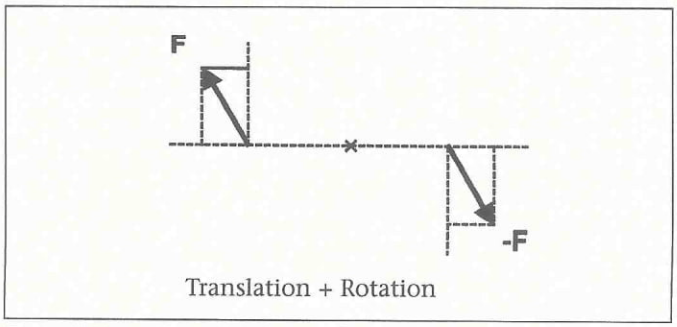



**Figure 3.** Newton's third law for translation and rotation.

New Energy Times Archive

therefore, this partition must apply in all branches of Physics: classical Physics, special relativity, electromagnetism, and quantum mechanics, as shown in our review paper.[3] Therefore, special relativity and quantum mechanics are both incomplete theories, since they imply the existence of internal forces associated to the reciprocity concept and the conservation of energy and ignore the existence of external forces.

The existence of external forces which do not satisfy Newton's third law deserves special attention, since one must recognize from the above calculation that there is no energy conservation principle, for that kind of force. Most of our technology (motors and generators) does comply with the energy conservation principle, because of Newton's third law. It is the reason why the efficiency of (motors and generators) can never be higher than 100% because they work as closed systems (note that the efficiency of energy transforming machines is an item of thermodynamics for closed systems, however the limit 100% is fixed by Newton's third law). The existence of external forces implies the existence of open systems where the energy is provided by other particles located outside the system or by the medium. Therefore, classical mechanics does not forbid the existence of the so-called free-energy devices or over-unity devices, provided they use forces that do not satisfy Newton's third law. In the case of an open system, the efficiency can be higher than 100% because the work of the external force is not taken into account. The only question to be answered is how do we generate an external force? Since the Lorentz force does not follow Newton's third law, this force can be used for building the so-called free-energy devices.[26] Some physicists may disagree with this point of view, arguing that any system can be closed by taking into account other material particles in the Universe. But this is not so, since one can always define the center of mass of all particles, in the Universe, in that case, the energy related to the motion of this center of mass cannot be taken from the particles, but comes from the ether or the zero point energy of quantum mechanics. However, the partition between internal and external forces need not be applied to all particles in the Universe, and can be a local principle.

### 3. Newton's Third Principle and the Principle of Relativity in Classical Mechanics

Let us recall the three famous Newton principles, in the order of importance quoted in the literature: [27]

1. Every body continues its state of rest, or rectilinear uniform motion, unless it is compelled to change that state by forces impressed upon it.
2. The change of motion is proportional to the motive force impressed and is made in the direction of the right line in which the force is impressed.
3. To every action, there is always opposed an equal reaction, or the mutual actions of two bodies upon each other are always equal and directed to contrary parts.

Newton's laws are still fundamental to Physics. The form in which Newton published them has strongly influenced the subsequent development of Physics. Newburgh[28] stated that Newton's three laws are really two since the first law is included in the second law for the special case of zero momentum change. We disagree with this statement, for reasons that will be examined later in this paper. However, later in his paper, Newburgh makes some relevant comments which contradict his viewpoint.

To understand the principles of relativity and covariance in classical mechanics, we must show that the three Newton principles must be deduced from one another in the inverse order quoted above.[3,23-25] Therefore, Newton third law must be the first principle, since it implies the existence of two equations of motion as discussed in the preceding paragraph, namely:

$$M\frac{d^2\mathbf{R}}{dt^2} = \mathbf{F}_i \qquad m\frac{d^2\mathbf{r}}{dt^2} = \mathbf{F}_e \tag{12}$$

— The first equation defines the motion of a particle submitted to an internal force $\mathbf{F}_i$ resulting from the mutual interaction with a second particle ($\mathbf{F}_{12}$) and to external forces ($\mathbf{F}_{11}$,$\mathbf{F}_{22}$) produced by other particles, the particle itself or the ether.

— The second equation describes the motion of the center of mass. When the external forces are zero $\mathbf{F}_e = 0$, we recover Newton's first law, which only applies to the center of mass of the two particles.

Therefore, the superposition of an arbitrary rigid body motion only applied to this center of mass. As shown hereafter, the rectilinear uniform motion of the center of mass is at the heart of the misunderstanding concerning the relativity and covariance principles. It is the partition of forces obtained from Newton's third law which is the key for the understanding of what is wrong with these two principles. Note that the above analysis can be easily generalized to a system of N particles.

The relativity principle can be best analyzed when the motion of an object is observed from different reference frames. A well-known example is the case of a stone dropped in a moving train (see Figure 4). We know from the preceding paragraph that the relative motion is described by the equation:

$$M\frac{d^2\mathbf{R}_{12}}{dt^2} = \mathbf{F}_{12} + \frac{1}{m}(m_2\mathbf{F}_{11} - m_1\mathbf{F}_{22}) \tag{13}$$

where $\mathbf{R}_{12} = \mathbf{r}_1 - \mathbf{r}_2$ is the distance between the stone of mass $m_1$ and the train of mass $m_2$ knowing that the reduced mass and the total mass are respectively $M = m_1m_2/(m_1 + m_2)$ and $m = m_1 + m_2$. Since we have $m_1 << m_2$, the preceding equation becomes:

$$m_1\frac{d^2\mathbf{R}_{12}}{dt^2} \approx \mathbf{F}_{12} + \mathbf{F}_{11} \tag{14}$$

Because the mass of the Earth is large in comparison with the mass of the train, we must take into account the attraction of the Earth. Equation 13 does not change form if $m_2$ includes the mass of the Earth. In that case, the internal force $\mathbf{F}_{12}$ is the gravitational force and $\mathbf{F}_{11}$ is the external force applied to the stone by the moving train. The equation of motion for the center of mass of the train and the stone has for expression:

$$m\frac{d^2\mathbf{r}}{dt^2} = \mathbf{F}_{11} + \mathbf{F}_{22} = \mathbf{F}_e \Rightarrow m_2\frac{d^2\mathbf{r}}{dt^2} \approx \mathbf{F}_{22} \tag{15}$$



New Energy Times Archive

The coordinates of the stone and the train in the Earth reference frame are given by the relations:

$$\mathbf{r}_1 = \mathbf{r} + \frac{m_2}{m}\mathbf{R}_{12} \approx \mathbf{r} + \mathbf{R}_{12} \tag{16}$$

$$\mathbf{r}_2 = \mathbf{r} - \frac{m_1}{m}\mathbf{R}_{12} \approx \mathbf{r} \tag{17}$$

At the initial time t = 0, we apply an interaction force in the y direction to drop the stone from the luggage rack. We also assume that at that time the external forces are zero and that the train has reached the uniform velocity U = constant in the y direction in the Earth reference frame, as shown in Figure 4.

For an observer located in the reference frame of the train, we have:

$$m_1 \frac{d^2Z}{dt^2} = F_{12} = -m_1 g \Rightarrow Z = -gt^2/2 \tag{18}$$

$$m_1 \frac{d^2Y}{dt^2} = F_{11} = 0 \Rightarrow Y = Y_1 \tag{19}$$

An Earth observer who follows simultaneously the motion of the train and the stone will see the same relative motion in both the Earth and train reference frames, namely a vertical straight line for the free-falling stone. However, if the Earth observer only follows the absolute motion of the stone relative to the Earth reference frame, he sees a parabola given by the relations:

$$z = Z \qquad y = Ut + Y \tag{20}$$

which is a Galilean coordinate transformation that results from the second equation of motion 12 in the absence of external forces.

The reciprocity of reference frames applies only to internal forces, which satisfy Newton's third law. Therefore, whatever the reference frame, the gravitational force cannot be canceled by a change of frame. By contrast, the change of reference frame for external forces is not reciprocal, since this kind of force does not satisfy Newton's third law. Therefore, the value of the external force will change with the choice of the reference frame; for example, this force can be made zero in the train reference frame. Thus, it is not surprising to get two different paths for the stone motion, depending on the choice of the reference frame. Consequently, the relativity principle for inertial reference frames in relative motion is defeated by the existence of external forces as correctly stated by Brillouin[1] (p. 45). Einstein's relativity principle refers to laws of Physics, but initial conditions have to be taken into account. These initial conditions cannot be considered as "law-like"; they are not invariant since they depend on the external forces applied, as shown in the above example.

## 4. Newton's Third Law and the Principle of Covariance in Classical Mechanics

The covariance principle in classical mechanics implies the invariance of both the acceleration and the force under a change of Galilean reference frame. Newton's second law applied to the particle 1, written in two different reference frames as shown in Figure 5, gives the two equations of motion:

$$m_1 \frac{d^2\mathbf{R}_{12}}{dt^2} = \mathbf{F}(\mathbf{R}_{12},t) \tag{21}$$

$$m_1 \frac{d^2\mathbf{r}_1}{dt^2} = \mathbf{F}(\mathbf{r}_1,t) \tag{22}$$

with the condition $F(R_{12},t) = F(r_1,t)$.

On the contrary, the relation $\mathbf{r}_1 = \mathbf{r} + m_2\mathbf{R}_{12}/m$ in Equation 16 implies the formula:

$$m_1 \frac{d^2\mathbf{r}_1}{dt^2} = m_1 \frac{d^2\mathbf{r}}{dt^2} + M\frac{d^2\mathbf{R}_{12}}{dt^2} \tag{23}$$

We have $m_1 \approx M$ for $m_1 << m_2$, in that case the preceding equation gives the relation $\mathbf{r}_1 \approx \mathbf{r} + \mathbf{R}_{12}$. Equation 15 can be rewritten as follows:

$$\frac{m_1}{m_2} m \frac{d^2\mathbf{r}}{dt^2} = \frac{m_1}{m_2}\mathbf{F}_e \Rightarrow m_1 \frac{d^2\mathbf{r}}{dt^2} \approx \frac{m_1}{m_2}\mathbf{F}_e \rightarrow 0 \tag{24}$$

The condition $m_1F_e/m_2 \rightarrow 0$ is verified if the particle 2 has an infinite mass, which is a necessary condition for the referential frame to be an inertial frame, and if the external force is not too great. Therefore, Equation 23 becomes:

$$m_1 \frac{d^2\mathbf{r}_1}{dt^2} \approx m_1 \frac{d^2\mathbf{R}_{12}}{dt^2} \tag{25}$$

Only in that case do we recover the covariance principle

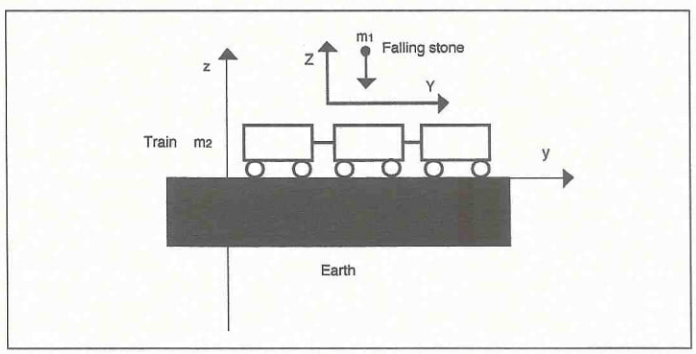



**Figure 4.** Motion of a falling stone relative to a moving train or to the Earth.

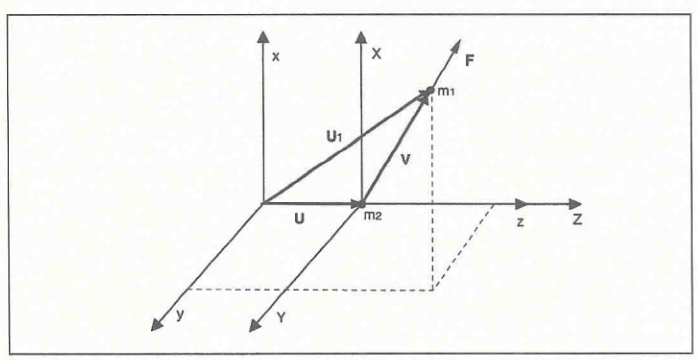



**Figure 5.** Galilean change of reference frame.

New Energy Times Archive

**The experimental evidence concerning these forces cannot seriously be denied any longer and should lead to important technical applications in the near future.**

and the equality of forces $F(R_{12},t) = F(r_1,t)$ under a change of reference frame.

In geometry, we use reference frames which are rigid and have no mass. However, there is no reference frame as such in nature. We have only particles and radiation in vacuum, therefore, we are compelled to locate the origin of a reference frame on a point particle or at the center of mass of a solid body. In that case, the reference frame has a mass and may or may not recoil depending on its mass.

Even in classical mechanics, we can argue about the covariance principle, because there are two equations of motion (Equation 12). We must point out again that the covariance principle in Galilean mechanics results from not taking into account the mass of the reference frame and Newton's third law. We note that the relative motion equation (first equation of Equation 12) is the only equation which is covariant and invariant under a change of reference frame in the absence of any external force. Therefore, this equation does not depend on the existence of the ether. In contrast, the center of mass equation does depend on the choice of a reference frame. This law of motion implies the existence of the ether, which can be chosen as the preferred frame of rest, particularly if we take into account all particles of the Universe.

Moreover, we can also contest the covariance principle of Equation 21,22 from a point of view based on the energy equations:

$$\frac{d}{dt}\left(\frac{1}{2} m_1 V_{12}^2\right) = \mathbf{V}_{12} \cdot \mathbf{F}(\mathbf{R}_{12},t) \tag{26}$$

$$\frac{d}{dt}\left(\frac{1}{2} m_1 U_1^2\right) = \mathbf{U}_1 \cdot \mathbf{F}(\mathbf{r}_1,t) \tag{27}$$

Thus, in Galilean mechanics, the particle one submitted to a force F, which is the same in two reference frames in relative motion, has a kinetic energy that is different in each reference frame, since the power is different in the two reference frames. Therefore, it suffices to change our reference frame to create as much free-energy as we want, because the velocity of the moving reference frame $\mathbf{U} = \mathbf{U}_1 - \mathbf{V}_{12}$ can be as large as we wish.

Not making any distinction between internal and external forces, the covariance and relativity principles blend together in Galilean mechanics as a principle of inertia. This principle states that Newton's laws of motion and energy are unaltered by a Galilean transformation:

$$\mathbf{r}_1 = \mathbf{r} + \mathbf{R}_{12} = \mathbf{U}t + \mathbf{R}_{12} \tag{28}$$

between two inertial frames in relative motion, which led to the two sets of equations 21,22 and 26,27. From the preceding discussion, one can understand that the covariance and relativity principles are radically different in Galilean and Newtonian mechanics. This point is so fundamental for the understanding of Physics that we must summarize the similarities and differences between the two mechanics.

The main difference concerns the reciprocity concept between reference frames which applies to the two reference frames attached to particles 1 and 2 in Newtonian mechanics, while in Galilean mechanics the reciprocal reference frames are attached to the particle 2 and the origin 0.

The second difference concerns the change of reference frame, which occurs when we go from Equation 4,5 to Equation 3 in Newtonian mechanics, while a Galilean change of reference frame implies Equations 21,22.

However, there is a similarity between the rectilinear uniform motion of particle 2 in Galilean mechanics and the same motion of the center of mass, which is almost located at the position occupied by the second particle if this particle is massive and provided that the external force is small or zero.

The above discussion does not depend upon the existence of the relativistic gamma factor. It follows that the relativity and covariance principles in special relativity can be refuted for the same reasons discussed above, because we must recover Newtonian mechanics for $U/c$ or $V/c \to 0$.

From Equations 16,17 one deduces the composition law of velocities for two particles:

$$\mathbf{U}_1 = \mathbf{U}_G + \frac{m_2}{m}\mathbf{V}_{12} \approx \mathbf{U}_G + \mathbf{V}_{12} \tag{29}$$

$$\mathbf{U}_2 = \mathbf{U}_G - \frac{m_1}{m}\mathbf{V}_{12} \approx \mathbf{U}_G \tag{30}$$

We see at once that the Galilean law of addition of velocities in classical mechanics is satisfied only if $m_1 << m_2$. We can always assume the equality $\mathbf{U}_0 = \mathbf{V}_{12}$, therefore we get $\mathbf{U}_1 \approx \mathbf{U} + \mathbf{U}_0$ for $\mathbf{U}_2 \approx \mathbf{U}_G \approx \mathbf{U}$ if the reference frame where the particle two is at rest has an infinite mass.

In classical mechanics, Newton's third law implies the conservation law of energy in any change of reference frame. Any violation of this law is due to the work of external forces and is attributed to the motion of the center of mass of the system. What are the reasons which have led to the covariance principle? The best explanation has been given by Panofsky and Phillips in their book[29] (p. 261) when they say: "If an equation has a form which is invariant to a change in inertial frame, then an experiment based on this equation obviously could not give a result depending on the particular frame of reference." They also state: "by no experiment of any kind should it possible to detect a preferred inertial frame."

From an experimental point of view, we contest in our papers[3,32-36] the last claim. But, the covariance principle is not required by Physics as already stated by Phipps[30] and Cornille[3,36] in both special and general relativity. In a review of the foundations of general relativity, Norton[31] summarizes Kretschmann's objections to the covariance principle by stating that general covariance is physically vacuous.

## 5. Conclusion

The review paper by Speziale indicates that the importance of Newton's third law is greatly underestimated in Physics. In fact, we think that this principle is the most important principle in Physics. For example, the principle of conservation of energy is directly a consequence of this principle. By taking into account Newton's third law, we have shown



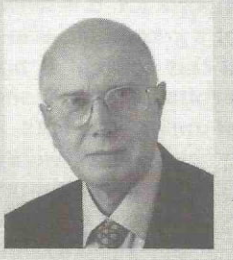
New Energy Times Archive

at the beginning of this paper that Newtonian mechanics is not equivalent to Galilean mechanics. The nonexistence of Newton's third law in both Galilean and special relativity mechanics necessarily led to the false concepts of covariance and inertial frame. Most physicists, including Einstein, did not understand the importance of Newton's third law. In the references,[3,19,23,26,33-36] we reviewed several electromagnetic experiments done with conductors that prove the existence of stimulated forces associated with external forces which violate Newton's third law. The experimental evidence concerning these forces cannot seriously be denied any longer and should lead to important technical applications in the near future. The experiments presented in these papers refute, beyond dispute, the principles of covariance and relativity. In this paper, we have shown that Newton's third law is the key to a better understanding of Physics.

## References


1. Brillouin, L. 1970. *Relativity Reexamined*, Academic Press, New York.
2. Speziale, C.G. 1998. "A Review of Material Frame-indifference in Mechanics," *Applied Mechanics Reviews*, Vol. 51, No. 8, p. 489.
3. Cornille, P. 1999. "Review of the Application of Newton's Third Law in Physics," *Progress in Energy and Combustion Science*, Vol. 25, No. 2, p. 161.
4. Graneau, P. 1985. *Ampère-Neumann Electrodynamics of Metals*, Hadronics Press, Inc., Nonantum, Massachusetts.
5. Graneau, P. 1985. "Comments on 'Equivalence of the Lorentz and Ampère Force Laws in Magnetostatics ,'" *J. of App. Physics*, Vol. 58, No. 9, p. 3638.
6. Graneau, P. 1989. "Longitudinal Forces in Ampère's Wire-arc Experiment," *Phys. Letters A*, Vol. 137, No. 3, p. 87.
7. Graneau, P. and Graneau, N. 1993. *Newton versus Einstein: How Matter Interacts with Matter*, Carlton Press, Inc., New York.
8. Graneau, P. and Graneau, N. 1996. *Newtonian Electrodynamics*, World Scientific, Singapore.
9. Moon, P. and Spencer, D.E. 1954. "The Coulomb Force and the Ampère Force," *J. of the Franklin Ins.*, Vol. 257, p. 305.
10. Moon, P. and Spencer, D.E. 1954. "Interpretation of the Ampère Experiments," *J. of the Franklin Ins.*, Vol. 257, p. 203.
11. Moon, P. and Spencer, D.E. 1954. "A New Electrodynamics," *J. of the Franklin Ins.*, Vol. 257, No. 5, p. 369.
12. Moon, P. and Spencer, D.E. 1955. "On Electromagnetic Induction," *J. of the Franklin Ins.*, Vol. 260, p. 213.
13. Moon, P. and Spencer, D.E. 1955. "On the Ampère Force," *J. of the Franklin Ins.*, Vol. 260, p. 295.
14. Moon, P. and Spencer, D.E. 1955. "Some Electromagnetic Paradoxes," *J. of the Franklin Ins.*, Vol. 260, p. 373.
15. Saumont, R. 1991. "Effets mécaniques du courant électrique dans les milieux conducteurs," *Comptes Rendus de l'Académie des Sciences*, Vol. 313, Série II, p. 389.
16. Saumont, R. 1992. "Mechanical Effects of an Electrical Current in Conductive Media: Experimental Investigation of the Longitudinal Ampère Force," *Phys. Letters A*, Vol. 165, p. 307.
17. Saumont, R. 1995. "La force longitudinal d'Ampère," *Fusion*, Vol. 55, No. 3/4, p. 52.
18. Cornille, P. 1989. "On the Difference Between the Lorentz and Ampère Force Law in Magnetostatics," *J. of Physics A: Math. and Gen.*, Vol. 22, p. 4075.
19. Cornille, P. 1992. "On the Meaning of Special Relativity in the Earth Frame," *Phys. Essays*, Vol. 5, No. 2, p. 262.
20. French, A.P. 1968. *Special Relativity*, W.W. Norton and Company, New York.
21. Wesley, J.P. 1987. "Weber Electrodynamics Extended to Include Radiation," *Spec. in Science and Technology*, Vol. 10, No. 1, p. 47.
22. Wesley, J.P. 1990. "Weber Electrodynamics, Part I: General Theory, Steady Currents Effects," *Found. Phys. Letters*, Vol. 3, No. 5, p. 443.
23. Cornille, P. 1996. "Derivation of the Ether from Anomalies in Newton's Third Principle," p. 103, *New Frontiers in Physics*, Vol. I (Ed. T.L. Gill), Hadronic Press, Palm Harbor, Florida.
24. Cornille, P. 1998. "Newton's Third Principle in Physics," *Physics as a Science*, Hadronics Press, Inc., Palm Harbor, Florida.
25. Cornille, P. 1999. "Newton's Third Principle in Post-Newtonian Physics, Part I: Theory," *Gal. Electrodynamics*, Vol. 10, No. 3, p. 43.
26. Cornille, P. 2000. "Newton's Third Principle in Post-Newtonian Physics, Part II: Interpretation and Experiment," *Gal. Electrodynamics*, Vol. 11, No. 4, p. 69.
27. Anderson, J.L. 1967. *Principles of Relativity Physics*, Academic Press, New York.
28. Newburgh, R. 1995. "Newton's Third Law: A Criterion for Particle Behavior of Extended Bodies," *Phys. Essays*, Vol. 8, No. 3, p. 330.
29. Panofsky, W.K.H. and Phillips, M. 1956. *Classical Electricity and Magnetism*, Addison-Wesley Publishing Company, Reading, Pennsylvania.
30. Phipps, T.E., Jr. 1986. *Heretical Verities: Mathematical Themes in Physical Description*, Classic Non-Fiction Library, Urbana, Illinois.
31. Norton, J.D. 1993. "General Covariance and the Foundations of General Relativity: Eight Decades of Dispute," *Reports on Prog. Physics*, Vol. 56, No. 7, p. 791.
32. Cornille, P. 1995. "The Lorentz Force and Newton's Third Law," *Can. J. Physics*, Vol. 73, No. 9 & 10, p. 619.
33. Cornille, P. 1996. "Why Newton's Third Principle is the Most Important Principle in Physics," *International Conference: Descartes and Scientific Thought 1596-1996* (Ed. U. Bartocci), Perugia.
34. Cornille, P. 1998. "Making a Trouton-Noble Experiment Succeed," *Gal. Electrodynamics*, Vol. 9, No. 2, p. 33.
35. Cornille, P., Naudin, J.-L., and Szames, A.D. 1998. "Way Back to the Future: Why Did the Trouton-Noble Experiment Fail and How to Make It Succeed," p. 81, *Physical Interpretations of Relativity Theory VI* (Ed. M.C. Duffy), Imperial College, London: September 11-14, British Society for the Philosophy of Science.
36. Szames, A.D. 1998. "Histoire secrète de la plus grande découverte scientifique du XXe Siècle," In: Alexandre Szames, editor, *Coll. Histoire secrète de l'antigravité* (Vol. 1). 47-51 Rue d'Aguesseau, 92100 Boulogne, France.


### About the Author



Patrick Cornille received his Ph.D. from Lille State University (France) in 1968. He held a post-doctoral position at Berkeley University (U.S.) in the geophysical research department from 1968 to 1969 studying Electromagnetic soundings. In 1970, he joined a French state laboratory (CEA) as a researcher. He did research in numerical analysis for the implementation of hydrodynamic and magneto-hydrodynamic codes on computers. From 1980 through 1993, he was concerned with research in radiation hydrodynamics, electromagnetism and special relativity. During this time, he succeeded in publishing a new interpretation of the special relativity theory. From 1993 to 1997, he was mainly concerned with doing theoretical research in electromagnetic theory and antenna radiation. He was able to give a new demonstration of the Maxwell's equations which takes into account the existence of scalar waves in vacuum. Since 1997, he has been doing research in plasma physics. He published thirty-three papers, among them eight collected books. In 1998, he founded AES, a company devoted to R&D for free-energy devices.


*Advanced Electromagnetic Systems, 4 Rue de la Pommeraie, 78470 St-Rémy-Lès-Chevreuse, France
Phone/Fax: 33-1 30 52 41 83; E-mail: patrick.cornille@libertysurf.fr


New Energy Times Archive

# Special Relativity in RETROSPECT

George Galeczki*

**Abstract**

The "special" theory of relativity (SRT) is no relativity theory at all. A relativistic theory, like those of Weber and of Mach, involves only relative positions $r_{ij} = r_j - r_i$ and their higher derivatives with respect to universal, absolute time, while in SRT positions are defined relative to fictitious, non-interacting "frames of reference." SRT has never been experimentally tested, since its postulates and its scenario do not belong to a physical reality amenable to scientific investigation. In the following essay, the emphasis will be on the formal inconsistencies of SRT, quite independent of experiment.

**What is SRT?**

The division of Einstein's canonical (1905) article in "kinematic" and "electrodynamic part" shows that "special" relativity theory has been devised as *a new kinematics,* to replace the kinematics of Galileo and Newton embodied in

$$r' = r - V.t; \quad t' = t \qquad (1)$$

Newton's dynamical equation of motion is *invariant* under these so-called Galilean *coordinate transformations,* as long as forces depend on relative positions. It is usually thought that r, r', and V represent the coordinates of a moving "point-like body" in two relatively moving *inertial frames of reference* (IFR) (S) and (S'), V representing the uniform, relative velocity between (S') and (S). The fact that Equation 1 is identical with the *definition of uniform velocity* of one "point-like body" starting to move in (S) at t = 0 goes generally unremarked, although it is of crucial importance. It is senseless to investigate the consequences of a coordinate transformation implying *uniform velocity,* if this concept is not clearly defined. Now, the only conceptually sound and experimentally practicable definition of uniform velocity is the *time-of-flight* (TOF)-*velocity*. Unlike *non-uniform velocity,* which could be measured by time integration of the output of an accelerometer at one place, *uniform velocity requires a non-local measurement, with the help of two synchronized clocks at a distance.* The velocity concept in SRT is both conceptually and operationally different from the TOF-velocity. The so-called Radar-velocity uses a clock and a signal emitter/receiver, the signal velocity being fixed by decree (the second postulate of SRT) as 'c.' One realizes immediately that if a distant object is moving with a velocity higher than the signal velocity 'c,' the signal could not be reflected from the body and be returned to the receiver, therefore "over 'c'" velocities would not be—even in principle—measurable, and would appear as infinitely large.

No such "limitation of principle" exists for the TOF velocities of the Galilean kinematics. The very attempt to build a new kinematics by conferring a primary role to velocity and a secondary one to coordinates is fallacious, although some of Einstein's followers—David Bohm, among others—quoted Piaget's ideas on the development of a child's spatio-visual perception in support of it. Moreover, to claim that Galilean kinematics and velocity were valid *within* one IFR, while SRT kinematics *between* two IFRs, is patently absurd and schizophrenic, as discussed elsewhere.[1] Indeed, if three "objects" A, B, and C were moving uniformly along the x-axis in the IFR (S), their velocities would be connected through:

$$w_{BC} = w_{AC} - w_{AB} \qquad (2)$$

while the velocity of "object C" in IFR (A), respectively (B), would be connected according by the "hyperbolic" addition law of SRT:

$$(v_{AC} - v_{AB}) / (1 - v_{AC}.v_{AB}/c^2) \qquad (3)$$

*Obviously, changing the status of A and B from "object" to "frame of reference" cannot change the composition law of the velocities of A, B, and C. The kinematics of SRT is therefore untenable, since it is incompatible with the concept of uniform velocity.*

**The SRT Scenario**

Although the concept of *inertial frame of reference* (IFR) later played a central role in SRT, Einstein avoided for many years—more exactly, until he finally got the Nobel prize—its clear definition and talked only about "the rest system" and "the moving system," respectively. He called "good" systems those coordinate systems "for which the laws of mechanics (which one? ) are valid."[2] In 1938 he wrote: "The question as to whether an inertial system exists at all is still unsettled. But if there is one such system, then there is an infinite number of them. Every CS (coordinate system) moving uniformly, relative to the initial one, is also an inertial CS." The plain fact is that IFR is the idealization of a force-free situation, which can only be approached approximately in reality.

*Einstein's triple infinity of bodiless, massless IFRs roaming in all directions with uniform velocities, interpenetrating without interacting with each other, or with other objects, simply doesn't exist.* Moreover, if IFRs were supposed to be more than CSs, they should have infinitely large *inertial* masses[3] but zero *gravitational* ones.

The essence of SRT is the coordinate transformation $T_{I,I}'$: (x, y, z, t) ----◊ (x', y', z', t') relating two fictitious IFRs. Such transformations had been derived and investigated in the Ph.D. thesis (Göttingen) of Woldemar Voigt two years before Einstein's birth and published in 1887! Lorentz, for his part, expressed in the 1920s his regret that at the time of his work on the theory of electrons (1895) he was unaware of Voigt's work. Poincarè, however, christened in 1905 (before the publication of the canonical article on SRT) the $T_{I,I}'$ coordinate transformation as the "Lorentz transformation" (LT). Einstein took over—without bothering to mention it—the results of Voigt, Lorentz, and Poincarè, and attempted to re-derive the LT starting from two postulates. His lengthy derivation, performed obviously with the result before his eyes, is so cum-



New Energy Times Archive

bersome and self-contradictory that, with one exception,[4] no SRT book author dares to reproduce it. After tens—if not hundreds—of attempts to justify the LT, a formal, group-theoretical approach, based on seven postulates[5] emerged. *Group theory requires the existence of an infinity of IFRs on equal footing.* The first three postulates are not related to group theory *per se*:

*Postulate 1:* Straight (x, t) particle trajectories in the IFR I transform into straight (x′, t′) trajectories in I′.

*Postulate 2:* Finite (x, t) values transform into finite (x′, t′) values.

*Postulate 3:* The origins of I and I′, coincide at t = 0. One has the following transformation $T_{I'I}$ connecting (x′, t′) with (x, t):

$$x' = \gamma(V)\,(x - Vt)$$
$$t' = \alpha(V)t + \beta(V)x \qquad (4)$$

where $\gamma(V)$, $\alpha(V)$, and $\beta(V)$ are arbitrary functions of the relative velocity V between I and I′. Since ordinary, three-dimensional translations form a group, one requires the following group properties from *translations with uniform velocities*, too:

*Postulate 4: Reciprocity* of the relative velocity between I and I′:

$$V = V_{I'I} = -V'_{I.I'} = V \qquad (5)$$

*Postulate 5:* The existence of the *inverse* transformation $T_{I'I}$ leads to the form:

$$x' = (x - V.t)[1 - \mu(V).V^2]^{-0.5}$$
$$t' = [t - \mu(V)Vx][1 - \mu(V).V^2]^{-0.5} \qquad (6)$$

where $\mu(V) = -\beta(V)/V.\alpha(V)$.

*Postulate 6:* Two successive, ordinary transformations being always equivalent to one single transformation, one requires *transitivity*:

$$T_{I.I''}(V'') = T_{I.I'}(V)T_{I'.I''}(V') \qquad (7)$$

which implies the following velocity composition law:

$$V'' = (V + V')/(1 + \mu VV') \qquad (8)$$
$$\text{and } \mu = \text{constant.}$$

We see that the transformation still contains the *unknown constant μ:*

$$x' = \gamma(x - V.t);$$
$$t' = \gamma(t - \mu.V.x);\ \gamma \equiv [1 - \mu.V^2]^{-0.5} \qquad (9)$$

To fix the constant μ one imposes a seventh, non-group-theoretical postulate:

*Postulate 7:* $x' = c.t'$ for $x = c.t$ (10)

which leads to $\mu = 1/c^2$.

*It is not easy to swallow that even this seemingly most "clean" and elegant derivation of LT is untenable!* It has, however, the distinct advantage that it illuminates the sore points. First, *it turns out that commutativity and transitivity, most important group properties naturally fulfilled by the Galilean transformations (1), do not hold for the LT in three spatial dimensions.* For those conversant with group theory, this is a mathematically secured fact. Indeed, the algebra of the infinitesimal operators:

$$R_1 = z\,\partial/\partial y - y\,\partial/\partial z \quad R_2 = x\,\partial/\partial z - z\,\partial/\partial x \quad R_3 = y\,\partial/\partial x - x\,\partial/\partial y$$
$$L_1 = x\,\partial/\partial t + t\,\partial/\partial x \quad L_2 = y\,\partial/\partial t + t\,\partial/\partial y \quad L_3 = z\,\partial/\partial t + t\,\partial/\partial z \qquad (11)$$

which leave the form $x^2 + y^2 + z^2 - t^2$ invariant is a Lie-algebra with a structure given by the commutation relations:

$$[R_i, R_j] = R_k \;;\; [L_i, L_j] = -R_k \;;\; [R_j, L_j] = 0$$
$$[R_i, L_j] = L_k \;;\; [R_j, L_i] = -L_k \;;\; (i, j, k) = (1, 2, 3) \qquad (12)$$

In one spatial dimension only the infinitesimal operator $L_1$—the so-called "Lorentz boost"—is different from zero, in other words, in this case the Lorentz boosts form an Abelian group. *In three spatial dimensions one has to add spatial, timeless rotations, in order to regain the group properties. This, of course, contradicts the definition of the IFR as a non-accelerating, non-rotating, non-interacting frame of reference,* although it is meaningless to mention dynamic concepts like "interaction" in connection with abstract CSs, not belonging to this world.

*Second,* a fundamental contradiction involved in the LT is due to the fact that *x, y, z, t , V above are physical quantities, rather than dimensionless, mathematical numbers:* [*physical quantity*] = [*mathematical quantity*].[*unit of measurement*].

In the enormously rich SRT literature, the distinction between mathematical and physical quantities is generally ignored. Sometimes, without any comment, it is assumed that the observer's units of length and time change with velocity, while at other times that the moving body contracts and moving clocks slow down, thus maintaining a perennial confusion in the minds of professionals and amateurs alike. In his own "derivation" of LT, McCrea[6] states that according to the principle of relativity, the equations of the spherical wave front from an isotropic source, viewed from the two relatively moving IFRs (S) and (S′) have to be proportional:

$$(x^2 + y^2 + z^2 - c^2t^2) = \kappa(x'^2 + y'^2 + z'^2 - c'^2t'^2) \qquad (13)$$

where κ is a constant. "Further c, c′ can differ only through a difference of units in (S), (S′) , for a difference depending on V would contradict the principle of relativity. We may therefore suppose *the units so chosen that c = c′, and then a further adjustment of units would make κ = 1.* Then (13) shows that the quantity $x^2 + y^2 + z^2 - c^2t^2$ is invariant under the transformation sought." Those finding this unbelievable are invited to look on page 10 of McCrea's book.

*Obviously, changing the length and time units from [L] and [T] to [L]* and [T]*, so that to make c = c′, the relative velocity between (S) and (S′) will no more be reciprocal:* $V_{I'I}$ *m/s =/= -*$V_{I.I'}$ *m*/s* !!* The reciprocity of relative velocities, however, is a basic kinematical requirement, as further discussed in the following chapter.

### "Still It Moves": Kinematics and Dynamics

The large community of "special" relativists is, like the Church, far from being homogeneous. There are *Lorentzians, Einsteinians, neo-Lorentzians, pure relativists,* as well as various oxymoronic combinations of these. After decades of playing "Heads I win, tails you lose" and usurping the Lorentzian absolute effects—time dilation, length contraction, mass-increase with velocity—SRT turns silently into neo-Lorentzianism. Sachs[7] is among the very few "pure relativists," who—following the early contention of Henri Bergson that all relativistic effects were reciprocal, perspective effects—sees the LT as change of scale with no physical consequences on "clocks" and "rods." This is in line with our view of the LTs as a new—but unfortunately false—kinematics. It is worth mentioning that Einstein himself remained divided during his lifetime, by considering the "Lorentz contraction" as an apparent effect due to relative motion, but seeing the "clock retardation" as an absolute effect. *At this moment I have to point out that both active (Lorentz, Poincarè, Jánossy, Bell), and*



New Energy Times Archive

*passive (Bergson, Cullwick, Sachs) interpretations of the LT are wrong, simply because the LT itself is wrong.*

All accumulated human experience points toward a *hierarchical structure of the universe,* from atoms to clusters of galaxies. Instead of an infinity of IFRs on equal footing, there is one fundamental, privileged, unique inertial frame of reference, the dynamical extrapolation of a chain of better and better approximations of an IFR. *For any dynamical system the frame associated with the center of mass is a unique and privileged one.* Inertial mass is roughly proportional to the reciprocal velocity of an object and both are absolute. Absolute mass is a function of absolute velocity, which could and has been determined by successive approximations. "Rest mass" is unique and different from "proper mass" and could be determined by extrapolation toward low velocities. Unlike coordinate transformations, Newtonian dynamics and the conservation laws of energy, linear and angular momentum are fundamental for physics. As pointed out[8] in a remarkably unknown book:

> Every dynamical problem is not determined by the dynamical equations alone, but by these equations together with the *initial conditions,* which include the initial positions and the initial velocities, the last determining the initial kinetic energy of the dynamical system under consideration. Now when we pass from one frame of reference to another, moving in relation to the first with a velocity constant in magnitude and direction, this corresponds to a sudden change of the kinetic energy of the system. Such passage from one frame of reference to another, from a dynamical standpoint is thus impermissible, because it corresponds to a sudden creation or destruction of energy. . . The so-called Galilean principle of relativity, thus never holds in dynamics, and the passage from one frame of reference to another, moving even with uniform velocity in relation to one another, is entirely impermissible from the standpoint of conservation of energy.

*Relative velocity* being defined as the difference of two absolute velocities:

$$r_{ij} = r_j - r_i = -(r_i - r_j) = -r_{ji} \qquad (14)$$

*has to be reciprocal, provided time is universal and absolute.* As emphasized by Lovejoy,[9] "One body cannot start to become nearer to the other unless the other *at the same instant* starts to become nearer to it; if the latter is denied, it is *thereby* denied that any relative motion between them has begun." This is a purely kinematical statement, no matter whether the two bodies interact, or not. It has nothing to do with instantaneous-action-at-a-distance (IAAAD) eagerly discussed in recent years. To illustrate this on a specific example: kinematically it is indifferent whether the Earth moves around the Sun, or the other way around; dynamically not! We are bound to dynamical laws and the higher mobility of lower masses has always been confirmed; indeed the mountain is not coming to the prophet, but the prophet has to undertake the trouble. The "case Galileo" is well-suited to an analysis within the instrumentalism *vs.* realism scenario.[10] Galileo himself never clearly distinguished between kinematics and dynamics and provided no conclusive piece of evidence for the Copernican system. Nevertheless, one has to acknowledge that his obstinacy—excepting some emotional components of the controversy—has not been rooted in instrumentalistic thinking. *"Still It Moves" is meaningful only if the Earth moves in the absolute sense, i.e.* it orbits around the Sun.

The Church, on the other side, argued all the time in an instrumentalistic way and saw (for a while) no danger in considering the Copernican system as a useful working hypothesis. (This coincided with the position of Einstein and Infeld in 1938, who claimed that the Sun and Earth are equally well-suited to be used as frames of reference.) The highlight of the Galileo case is the survival of the confrontation between instrumentalism and realism to our day. Disputes and controversies keep science alive and are necessary ingredients for the development of a comprehensive world view. However, the lack of clear and open presentation of basic assumptions, hypotheses, approximations, or their conscious disregard, might often lead to unproductive, science-retarding frictions between opposing camps. Just like the "hidden parameters" in quantum mechanics, "hidden assumptions" have to be thoroughly researched, even if such a process implies (quite naturally) uneasy questions and dogmatic reactions, and Psimopoulos and Theocharis[11] (P&T) have pointed out the contradiction between the kinematic equivalence of Einstein's reference frames and the dynamically secured absolute motion of the Earth around the Sun. The only reaction was a letter to the Editor of *Nature*, totally irrelevant for the point made by P&T, namely: "the models of Copernicus and Einstein, respectively, are topologically different and Galileo's struggle has only shown the untenability of a theological model." Period. The objection of P&T, however, brings to daylight a dogmatism of the orthodox relativists comparable to that of the Church. The dynamically justified point of view, according to which the center of mass of a mass distribution defines a unique, privileged frame of reference, doesn't fit "special" relativistic kinematics. One encounters similar difficulties with the forcing of all known and yet to be discovered laws of nature in the Procrusteanbed of the Lorentz transformation.

### Special Relativity and Electrodynamics

As the previous chapters clearly show, SRT can be dismissed on kinematic and dynamic grounds. However, since Einstein based the SRT on Maxwell's electrodynamics—even if later he tried to drop this "umbilical cord"—and since in the mind of present day physicists the two theories are seen as supporting each other, a short incursion in electrodynamics is in order. Max Born, Einstein's life-long friend, who first learned electrodynamics in 1908, in Göttingen from Minkowski, expressed his admiration for Einstein's building his theory on experiment. Indeed, the opening paragraph of the "canonical" article of 1905 starts with the description of motional induction taken from Föppl's book, which Einstein used as a student: "It is known that Maxwell's electrodynamics in its present form leads in its application to moving bodies to an asymmetry which is apparently not characteristic of the phenomenon itself. Consider, for example, the reciprocal electrodynamic interaction of a magnet and a conductor. The observable phenomenon here depends only on the relative motion of the conductor and the magnet, whereas the customary conception draws a sharp distinction between the two cases in which either one or the other of these bodies is in motion." *Although the phenomenon itself is correctly described, it has nothing to do with the rest of the article, respectively with the SRT. The scenario of SRT involves a physical system and two relatively moving*



New Energy Times Archive

IFRs (S) and (S'), while Einstein's example doesn't distinguish between "system" and "reference frame" and mentions only the relative motion between the two components—the conductor (i) and the magnet (j)—of the system. Einstein has, obviously, in mind *the true, relational relativity theory of Weber and Mach* (Bartocci and Capria call this "the principle of relative motion[12] which is the same), in which only relative positions and their higher derivatives occur. But this is not the theory referred to virtual "observers" on equal footing, which SRT is supposed to be! The above example shows at once Einstein's good physical intuition and his defective, contradictory theoretical conclusions. Another example which comes to mind is the second postulate of SRT, in which the independence of the velocity of light on the velocity of the source—a characteristic of wave propagation in a medium—is silently converted into independence of the velocity of the observer/receiver. In the same context and also silently, the TOF Newtonian velocity is replaced by the two-way, averaged, Radar-velocity, and used without discrimination by all "special" relativists until today. I leave here the list incomplete.

The goal of the second, electrodynamic part of Einstein's 1905 article has been the proof of the *invariance* of Maxwell's equations under LT. Three critical remarks are compulsory: *First,* the proper mathematical term should be *covariance,* rather than *invariance.* Unlike the Galilean transformation (1), which leaves Newton's second law (but not the boundary conditions!) invariant, the Lorentz transformation implies a mixing (or, scrambling, in Phipps' very suggestive language) of the components of the field vectors E, B, D, H, with the corrolary that all magnetic fields were electrical fields viewed from a uniformly moving IFR.

*Second,* even in electrodynamics Poincarè has been in advance of Einstein, without regard to the tenability, or not, of the Lorentz transformation. Indeed, as pointed out by Keswani:[13]

> Poincarè's paper (submitted June 5, 1905) contained not only an inspiring programmed sketched for a relativity theory (faint praise by Sir Karl Popper). It contained the following: reference to negative results of experiments undertaken to measure the absolute motion of the Earth; it is a general law of nature that absolute motion cannot be demonstrated; LT; LT forms a group; invariance of Maxwell's full equations under LT; LT mean that the absolute motion cannot be detected; "relativistic" velocity-addition formula; gravitational waves are propagated with the velocity of light. Earlier, Poincarè had enunciated the principle (of relativity) and the second postulate. Oh! Will a Daniel come to judgment?

The best English translation of Poincarè's two articles on electrodynamics, submitted on June 5 and July 23 (the famous "Palermo paper," mysteriously disappeared from the Einstein archive), respectively, has been published by Acad. A.A. Logunov in his book in 1984.[14]

*Third and most important:* even if the LT were correct, *SRT was an undue mixture between the independent, Eulerian coordinates* x, y, z, t *in the observer frame of reference and the so-called Lagrangean* x(t), y(t), z(t) *coordinates (with 't' as parameter) of a moving particle.* The concept of "pseudo-Euclidean Minkowski space," with its false invariant (see below) relies upon Eulerian x, y, z, t , while particle dynamics is formulated by means of the Lagrangean coordinates x(t), y(t), z(t);
*'t' is the parameter of dynamics, rather than a "fourth coordinate" on equal footing with x, y, z. Only continuous, field theories—like Maxwell's— described by equations with partial derivatives could, if at all, be described by means of Eulerian coordinates. Particle dynamics, however, as discrete, atomistic theory, is compatible only with ordinary differential equations with the Lagrangean coordinates as solutions.* Since for several decades the general trend in the SRT books has been the derivation of the LT starting from the quadratic form $(ct)^2 - (x^2 + y^2 + z^2) = (ct)^2 - r^2$, we shall argue, following[15] that *the only possible value, compatible with the use of x, y, z, t in particle dynamics and with the second postulate of SRT (i.e. x' = c.t' for x = c.t), of this quadratic form, is zero.*

Indeed, the traditional starting point is the equation of a spherical wave front originating from an isotropic source of light. This is obtained *by equating, in our 3D-physical space, the Euclidean radial distance* $(x^2 + y^2 + z^2)^{0.5}$ with the distance covered by the wave front with velocity 'c' in time 't,' provided it has been emitted at time t = 0 from the source. This sounds perfectly reasonable, since it fits all our representations about space and motion. We can, of course, trivially rewrite $(ct)^2 = r^2$ as $(ct)^2 - r^2 = 0$, without changing an *iota.* We are entitled to ask what will $r^2$ equal, if the distance r is covered by a particle with velocity v? According to SRT it would be $c^2(t_p^2 - \tau^2)$, with $t_p$ denoting the time needed to cover the distance r with velocity v and the "proper time" $\tau$ being, supposedly, the indication of a clock co-moving with the particle. In other words:

$$c^2 (t_p^2 - \tau^2 ) = v^2.t_p^2 \qquad (15a)$$

$$\tau = (1 - v^2 /c^2 )^{0.5}.t_p = t_p/\gamma \qquad (15b)$$

This seems well-known, *i.e.* Minkowski's quadratic form seems to be different from zero, so long as we treat all the variables as pure, dimensionless, mathematical symbols. We have, however, to recall that $t_p$ is measured in the observer's reference frame, while $\tau$ in the "proper frame" of the particle and—as openly expressed by McCrea—the units of time in these two, relatively moving reference frames are different: sec* = sec/$\gamma$. It means that for "time = number-times-second," the equality $\tau$.sec* = $t_p$. sec/$\gamma$ would imply $\tau = t_p$!

In the words of Kanarev, as quoted by Bergman,[15] the displacement $s = c.t / \gamma$ of the particle could not take place in our 3D Euclidean world, since the theorem of Pythagoras would be violated. Indeed, "special" relativists are proud of Minkowski's formulation of SRT in a "pseudo-Euclidean" 4D geometry, in which the particle would have to move on a curved path. Although algebraically, *i.e.* with x, y, z, t *pure numbers*—rather than *physical quantities*—possible, a non-zero value of the Minkowskian quadratic form is impossible in the 3D world of particle dynamics. This has also been stressed by Gertrud Walton on her homepage.[16]

*The non-validity of invariance of Minkowski´s quadratic form implies, necessarily the Lorentz transformation, too.*

Well, if the LT is untenable, what happens with the fact that Maxwell´s field equations *in vacuum* are Lorentz covariant? Does the falsehood of LT have any implications for Maxwell's field theory? The answer to this perfectly justified question involves a longer preamble dealing with the limitations of Maxwell´s theory.[16] I shall restrict myself to several short statements:

A. Maxwell's four field equations are tautological, in the sense that they relate a given distribution of charge and current densities, to some configuration of fields, or, given a field configuration, the charge and current density distribution can be backwards calculated.



New Energy Times Archive

B. The charge and field densities have to satisfy at every moment t and in every point x, y, z the equation of continuity. Fields have various values at every x, y, z, t; x, y, z, t are not "moving with the field."

C. In order to become physically meaningful, the four field equations have to be completed with initial and boundary conditions, as well as with an equation of motion of a "test charge" in the field produced by the charges of the system under investigation. The force-law doesn't follow from the field equations and implies additional assumptions.

D. Maxwell's equations and the Lorentz force law $F_L = q(E + v \times B)$ are compatible only if the field B is produced by closed current loops. It is not the fundamental force—until now unknown—describing the interaction of two moving charges and it violates Newton's third law even for low ($v/c \ll 1$) velocities.

E. Faraday's law of induction, expressed mathematically by Maxwell as $\nabla \times E = -\partial B / \partial t$ is wrong. Electrical field can be induced even if $B = 0$. The correct law of induction has been formulated recently by Wesley[17] in the form:

$$E_{ind} = -dA/dt = -\partial A/\partial t - (v.\nabla)A - (A.\nabla)v \qquad (15)$$

This correct law of induction involves the total time derivative d/dt and destroys, therefore, the Lorentz covariance which requires $\partial/\partial x$, $\partial/\partial y$, $\partial/\partial z$, $\partial/\partial t$ to be on equal footing.

F. For low velocities, when radiation can be neglected, the electrodynamics built upon a correct force law is relativistic in Weber-Machian sense.

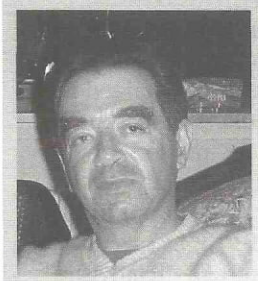
Finally, I am quoting from Gill:[18] "Things became critical after 1963 when Currie *et al.* showed that the minimal requirements for a relativistic quantum mechanics: *Hamiltonian representation, canonical independent variables and invariance under the Lorentz group, are* only compatible with non-interacting particles" (*sic!!*). A black sheep of the Establishment arrived at a similar conclusion,[19] too: "Let me emphasize once more what were the concepts introduced by special relativity: the Poincarè invariance and its corrolary, the conservation of energy-momentum; *the Minkowski space-time is unable to describe interactions between particles."* What a pity that charged particles have the bad habit of interacting with each other!

A conclusion section seems to me superfluous.

## References


1. Galeczki, G. 1989. "About Inertial Frames of Reference, Velocities, and Velocity-Dependent Masses," *Proceedings of the International Conference: Foundations of Mathematics and Physics,* September 27-29, Perugia, Italy, p. 93.
2. Einstein, A. and Infeld, L. 1942. *The Evolution of Physics,* Simon and Schuster, New York.
3. Brillouin, L. 1970. *Relativity Reexamined,* Academic Press, New York and London.
4. Prokhovnik S.J. 1967. *The Logic of Special Relativity,* D. Reidel, Dordrecht and Boston.
5. Süssmann, G. 1969. "Group-Theoretical Derivation of Lorentz Transformations," *Zeitschrift für Naturforschung,* 24a, 495.
6. McCrea, W.H. 1935. *Relativity Physics,* Methuen & Co. Ltd., London.
7. Sachs, M. 1971. "A Resolution of the Clock Paradox, *Physics Today,* September, p. 51.
8. Bothezat, G.de. 1936. *Back to Newton: A Challenge to Einstein's Theory of Relativity,* G.E. Stechert & Co., New York
9. Lovejoy, A.O. 1979. In: *The Einstein Myth and the Ives Papers,* The Devin-Adair Co., Old Greenwich, Connecticut.
10. Galeczki, G. and Marquardt, P. 1997. "Between Instrumentalism and Realism," http://www.helmut-hille.de.
11. Psimopoulos, C. and Theocharis, T. 1993. "Does the Earth Really Move?" *Nature,* 363, 108; Reply: *Nature,* 364, 96.
12. Bartocci, U. and Capria, M. 1991. "Symmetries and Asymmetries in Classical and Relativistic Electrodynamics," *Found. of Physics,* 21, 781.
13. Keswani, G.H. 1965-1966. "Origin and Concept of Relativity," (parts I, II, III and replies) *British Journal for Philosophy of Science,* 15, 286-306; 16, 19-32; 16, 243-248; 16, 148-153; 16, 235-236.
14. Logunov, A.A. 1996. "On the Article by Henri Poincarè: 'On the Dynamics of the Electron'" in: *New Frontiers in Relativity,* Hadronic Press, Palm Harbor, Florida.
15. Ishiwata, S. 1968. "Inconsistency of Special Relativity," *Bulletin of the American Physical Society,* 13, 662; Galeczki, G. 1994. "Will Quantum Mechanics Survive Special Relativity?" *Speculations in Science and Technology,* 17, 108; Kanarev, P.M. 1997. *The Crisis of Theoretical Physics,* Krasnodar, quoted by Bergman, D. in the *Proceedings of the First Cologne-Workshop: Physics as a Science,* Sept., Cologne, Germany, pp. 82-84; Walton, G. http://www.btinternet.com/~sapere.aude/index.tml/; Galeczki, G. 2001. "The Incompatibility between Minkowski's Quadratic Form and Any Dynamical Equation of Motion," *Proceedings of the Second Cologne-Workshop: Physics as a Science,* August 27-September 2, Cologne, Germany.
16. Wesley, J.P. 1991. *Selected Topics in Fundamental Physics,* Benjamin Wesley, Blumberg, Germany.
17. Wesley, J.P. 2001. "Faraday's Law Is Wrong," *Proceedings of the 2nd Cologne Workshop: Physics as a Science;* Phipps, T.E., Jr. 2000. "Generalized Total Time Derivatives," *Apeiron,* 7, 107-112; Galeczki, G. 2000. "The Locally Induced Electric Field," *Apeiron,* 7, 213-216.
18. Gill. T.L. 1996. "Classical and Quantum Relativistic Many-Particle Theory: A Proper-Time Lie-Santilli Formulation," *New Frontiers in Relativities, Proceedings of the International Workshop on New Frontiers in Theoretical Physics,* Monteroduni, Molise, Italy, August 9-12, p. 173.
19. Bacry, H. 1988. "Localizability and Space in Quantum Physics," in: *Lecture Notes in Physics,* Vol. 308, Springer-Verlag, Berlin, Heidelberg, New York, London, Paris, Tokyo.


### About the Author




George Galeczki received a License in Physics from Bucharest University in 1968, M.Sc. (1975) and D.Sc. (1979) degrees from the Technion—Israel Institute of Technology—in Haifa (Israel), for works in the field of ordered magnetism. In 1979 he received the Michael Landau Prize for his research beyond his work toward a degree. After lecturing three semesters at the Technion, he moved to the governmental research center in Rafael, where he did (mostly classified) work on HgCdTe-infrared detectors. After cumulating two sabbatical years, he left Israel, responding to an invitation from the University of Cologne (Germany). He did research on heterodyne HgCdTe-infrared detectors for astrophysical applications and continued, in parallel, his critical work in fundamental physics started in 1978 under the influence of Nathan Rosen ("the EPR one") and Marinov's successful experiment to measure the absolute velocity of the Earth. He published forty papers on magnetism, narrow-bandgap semiconductor physics, nanoscopy, and about an equal number of papers criticizing "special" and general relativities, Copenhagen quantum mechanics, and Big Bang theory. He is the co-author (with Peter Marquardt) of *Requiem to Special Relativity* (in German, published by Haag and Herchen, Frankfurt,1997) and organizer (with P. Marquardt and J.P. Wesley) of two (1997; 2000) Cologne-Workshops: *Physics as a Science.* He is presently an independent science consultant, science writer, president of the Society for the Advancement of Physics, R.S., and member of the Natural Philosophy Alliance.

*E-mail: nc-galeczge@netcologne.de




New Energy Times Archive

the experiment is done in an atmosphere of argon, the water is still capable of oxidizing some of the copper atoms to the copper-II ion.

It has been recently established that the copper-II ion is hydrated with five-fold coordination (Pasqerello, Alfredo, *et al.*, *Science*, Vol. 291, February 2, 2001, p. 856). An isotope of copper with natural abundance of 69.19% has an atomic weight of 62.93. Heavy water has a molecular weight of 20.027. The five-fold hydrated copper complex has a total molecular weight of $1(Cu^{2+}) + 5(D_2O) = 1(62.93) + 5(20.027) = 163.065$. This complex is in an atmosphere of argon and so will come into contact with an atom of argon. The atomic weight of the most abundant isotope of argon is 39.962. When an atom of argon contacts the hydrated copper complex, the total weight is $163.065 + 39.962 = 203.027 = 2(101.514) = 2(101.795)$. This is two units of the golden gate mass.

Any hypothesis is only as good as its predictions, so I will make a prediction. Remove the copper foil from the reactor and replace the heavy water with fresh and pure heavy water. Next, instead of a copper foil, simply dissolve copper sulfate ($CuSO_4$) into the heavy water. Put the copper sulfate solution under an atmosphere of argon. Expose the solution to the acoustic waves and the reported temperature of about 100 degrees Celsius. I predict excess energy and helium will be observed.

Gerald Lindley
Manchester, Connecticut

### A Call to Arms

The following is an open letter that *IE* subscriber Charles Brashears sent to Arizona Senator John McCain, as well as numerous national and Arizona newspapers, in mid-February 2001:

---

It is entirely possible that the energy shortage in California could spread to Arizona sometime in the future. As one of your constituents, I am asking you to seriously consider the promotion of a new, proven technology for low-cost, non-polluting, limitless energy, known as cold fusion, low-energy nuclear reactions, or chemically-assisted nuclear reactions. I understand that you were briefed on this technology when you were a presidential candidate. This is why I am asking especially for your support, since you are so open to these new ideas.

*Why is our government now spending billions of dollars on hot fusion research which has no proven merits, when it could be redirected into research on how to apply laboratory results to commercial production of cold fusion energy production, which does have proven merits?* As you know, the energy output with hot fusion does not exceed the input, while it does with cold fusion. Dr. Eugene F. Mallove is getting 13 watts of output with 6 watts of input in his laboratory experiments.

Please use your position and power as a U.S. senator to initiate a new, completely unbiased investigation into this new technology by the National Academy of Sciences, assisted by those scientists who are now doing research in cold fusion. As you know, an investigation was done in 1989, but this was a rush-to-judgment, even fraudulent, report by the Department of Energy. They were influenced by scientists having a self-interest in continuing their hot fusion research, and there were no checks and balances.

When this cold fusion knowledge is translated from laboratory experiments to commercial production, it will not only benefit us in Arizona: 1) It will benefit California, and the entire world, in its energy crisis. 2) It will solve the pollution problem. 3) It will help bring peace to the world (as many wars are fought over oil). 4) It will help our economy, as we will not have to pay other countries high prices for their oil, nor will we be held hostage to other countries withholding their oil from us. 5) It will help to reverse the global warming problem, which has the potential of causing disastrous problems for planet Earth.

Cold fusion researchers are having a very difficult time in obtaining patents for their new discoveries because the Patent Office officials do not understand the new physics and because of outright obstruction by the Department of Energy officials. I ask that you please look into those and do what you can to make patents easier to obtain for these pioneering scientists.

I thank you in advance for your kind assistance in helping Arizona, the United States, and the world by promoting this new technology known as cold fusion.

Charles Brashears
Prescott Valley, Arizona

*Dr. Mallove Responds:* Mr. Brashears was very kind to send such a sincere and thoughtful letter to Senator McCain. I regret to say, however, that after over a dozen years of attempting to communicate with our government on the issue of cold fusion, it is clear to me that essentially no action of any kind is likely to be taken by government bureaucrats or politicians until cold fusion and other "free energy" devices enter the marketplace as commercially available demonstration units or as utilitarian devices.—*EFM*

### Help Circulate *Infinite Energy*

In regards to Dr. Mallove's e-mail exchange with Scot Bruesewitz (*IE* No. 37), I have a suggestion that might help accelerate cold fusion commercialization. Scot should convince friends, relatives, fellow workers, anybody that shares his views to subscribe to *Infinite Energy* magazine. That's a tip other readers should follow. The general public needs to come together and make cold fusion commercialization a *national* priority.

Anthony Oglesby
Gaffney, South Carolina

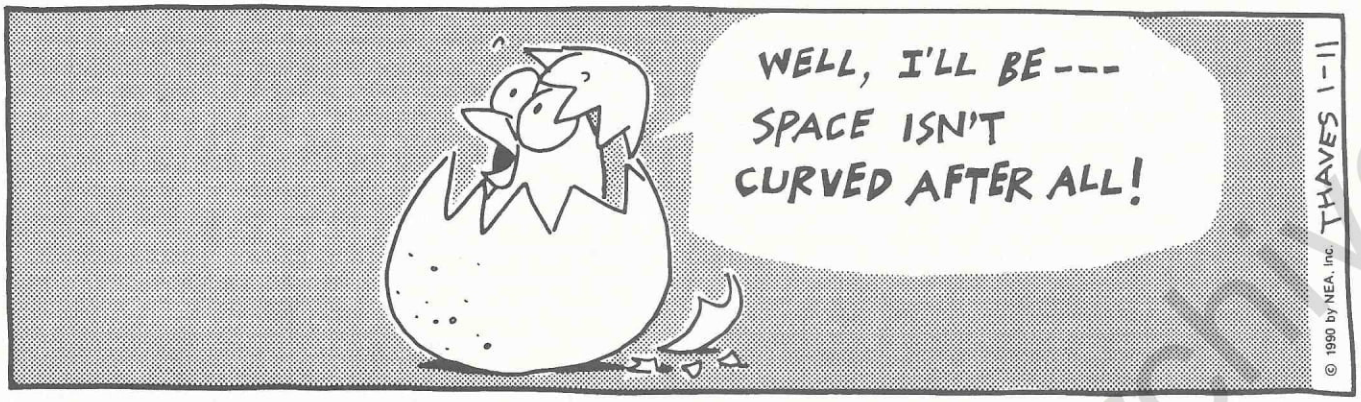
### Secret Ingredients

Now that Randell Mills has disclosed the secret ingredients [Sr + Ar + H (97/3%)] of his most productive Glow Discharge Cell (Randell Mills *et al.* "Optically Measured Power Balance of Anomalous Discharges of Mixtures of Argon, Hydrogen, and Potassium, Rubidium, Cesium, or Strontium Vapor," www.blacklightpower.com), one cannot but wonder if replacing part or all of the hydrogen with deuterium would result in the appearance of helium along with a proportionate amount of fusion energy.

Charles Stuart
Titusville, Florida

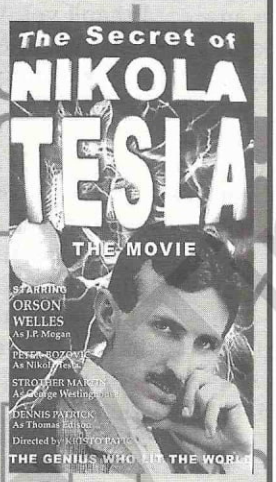
New Energy Times Archive

**FRANK & ERNEST® by Bob Thaves**




Reprinted with permission from United Media.


## *The Secret of Nikola Tesla: The Movie*

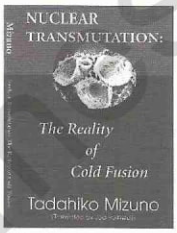



A penetrating study of the life and mind of a "scientific superman," who, against all odds, dedicated his life to the task of designing and improving technology for the service and advancement of humanity.

Starring Peter Bozovic as Nikola Tesla and Orson Welles as J.P. Morgan
1982 movie, Reissued 1999. Color, 105 min.
**$29.95 North America • $34.95 Foreign**

**Cold Fusion Technology, Inc.**
**P.O. Box 2816, Concord, NH 00302-2816**
**e-mail: staff@infinite-energy.com**
**http://www.infinite-energy.com**
**Phone: 603-228-4516 Fax: 603-224-5975**

**SALE . . . SALE . . . SALE . . .**




Hardcover, 1998

## Nuclear Transmutation:

The Reality of Cold Fusion

by Dr. Tadahiko Mizuno

Slightly Damaged Copies

$10.00 North America/$15.00 Foreign
(Regularly $32.95/$39.95)

Order from: Cold Fusion Technology
P.O. Box 2816, Concord, NH 03302-2816
Phone: 603-228-4516; Fax: 603-224-5975
Offer Not Available Online


*"A human being is part of a whole, called by us the 'Universe,' a part limited in time and space. He experiences himself, his thoughts and feelings, as something separated from the rest a kind of optical delusion of consciousness. This delusion is a kind of prison for us, restricting us to our personal desires and to affection for a few persons nearest us. Our task must be to free ourselves from this prison by widening our circles of compassion to embrace all living creatures and the whole of nature in its beauty."*

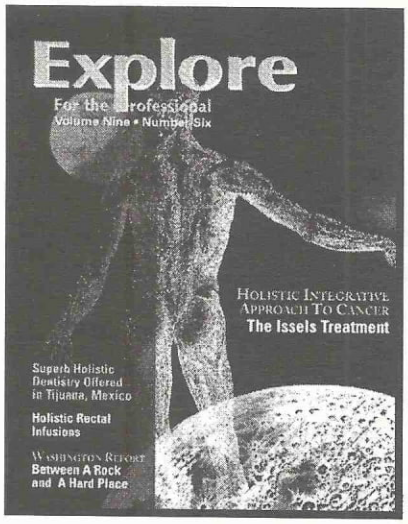
*— Albert Einstein*



New Energy Times Archive

## NOW IS YOUR CHANCE!

Get the most up-to-date medical research & discover new techniques & protocols in many disciplines of medicine and energy.




Order Explore! *for the Professional* for $79.00 (6 issues, including shipping) or order a sample copy for $7.50. Get a second subscription for your waiting room for only $59.00 (within USA).

Back Issues are STILL available; ask for an info packet for back issue information.

We gladly accept Visa, Master Card & Amex.
Call 800-320-6036 or 928-541-1920.
Fax 928-541-1906
email: info@explorepub.com

318 N. Rush Street,
Prescott AZ 86301

Explore! *for the Professional* is a great gift idea, you will be remembered All Year!


## Professional Service Directory


PH:203-924-9538, FAX:203-924-9956
FREE Gift if you visit OURPAL website
http://www.ourpal.com

E-Mail: PAL@OURPAL.COM
Jail-Mail: 203-924-4271
(AKA Voice-Mail)
Snail-Mail: 7 Woonsocket Avenue
Shelton, CT 06484
Free Inventrepreneurship Kit

OUR PAL(R) ASIJA, MBA, PE, CDP, JD, ATM
AFFORDABLE Intellectual Property Attorney

**New Energy Technologies Magazine**

- ❑ new energy
- ❑ advanced propulsion methods
- ❑ torsion generators
- ❑ space-time engineering experiments
- ❑ latest inventions from Russia

**6 Issues – $59.95** (Worldwide air mail delivery included.)
**Faraday Lab Ltd.**
**P.O. Box 37**
**St. Petersburg 193024 Russia**
Email: office@faraday.ru
Online: http://www.faraday.ru

**Are you fed up**

with unsubstantiated double-talk? Would you like to see a well-substantiated explanation of space, matter, gravity, electromagnetism, light, and time; something better than Einstein's flawed theories of space-time and relativity; the real reason for the accelerating expansion of the universe; and a logical, mathematically-substantiated unified theory?

Five little books written for the educated layman (*The Overview, Gravity, Electromagnetism, Light, and Time*) are now available, covering the foregoing subjects and more. For further details write to:

Lew Price (BLI)
P.O. Box 88
Garden Valley, CA 95633

**New Energy Power Systems (NEPS)**

Providing Consultation on Circuit Design and Operation; Programming to Your Specifications; Circuit and Software Prototyping. Marathon Systems is developer of the Mk12.30 Advanced Power Controller. Provides confidential consultation on operational requirements. Capabilities to design and test prototype circuits. Software programming. To purchase Electronic Controller, contact:

Marathon Systems Enterprises, Inc.
P.O. Box 7743, Gaithersburg, MD 20898

**Business Card Advertising:**
**$10.00 Size: 2 1/4" x 1 1/2"**
**Classifieds: 50¢ per word**

Special Back Issue Package
Issues 1-36 of *Infinite Energy*
$120.00
(normally $180.00)

For Domestic Customers Only.
Offer Not Available Online.
(603)228-4516

All Back Issues of
Infinite Energy Magazine
Always Available
Contact 603-228-4516
for Complete Listing


## Recent Highlights

**Issue No. 34 (72 pages)**
• The Collapse of Matter • An Energy Amplifier Device • Dark Matter and Cold Fusion • The Nuclear Strong Force Revisited • Transforming the Planet with a Zero-Point Energy Experiment • The Coming Energy Crisis • Experience with Lithium Catalyst in a 1987 Lincoln Town Car • UK Fuel Crisis

**Issue No. 35 (72 pages)**
• Second Annual Japan Cold Fusion Society Conference • Two Cold Fusion Conferences in the Washington, D.C. Area • The Plight of the Obscure Innovator in Science • Pull the Plug on the Department of Energy • Zetetic Ruminations on Skepticism and Anomalies in Science • What Really Happens in Bell Correlation Experiments? • On the Possible Role of Virtual Neutrons in Cold Fusion • Boson Condensation in High Temperature Systems and Its Relation to Cold Fusion • Overunity Motor Breakthrough? • A Conversation with Rashmi Mayur • Status Reports on Technologies and Claims

**Issue No. 36 (72 pages)**
• Cold Fusion, the Titanic Disaster, and the Internet • The California Electric Power Crisis • Extrasensory Perception of Subatomic Particles • Encounter with a Cover-Up: Examining a Forbidden Report • Do the Laws of Nature and Physics Agree? • Observation and Mass-Spectroscopy Study of Controlled Transmutation of Intermediate Mass Isotropes in Growing Biological Cultures • Gas Hydrates: Good News and Bad News • Top Ten Energy Innovations for 2010

**Issue No. 37 (72 pages)**
• The Mysteries and Myths of Heat: A Brief History of Hot and Cold • The Reproducible Thermal Anamoly of the Reich-Einstein Experiment Under Limit Conditions (Paulo and Alexandra Correa) • The Perfect Thermodynamic Engine • A Trial and Study on Obtaining Energy (Xu Yelin) • Butter Side Down: How Cold Fusion Researchers Battle the Innate Perversity of Inanimate Objects and Exploding Parameter Space • Tomorrow's Batteries • New Urban Myth About Energy Pervades Highest Levels of Government • Five Frozen Needles QRT/CF Protocol

**Issue No. 38 (96 pages)**
• Special Einstein Issue • Commentary on Maxwell's Equations and Special Relativity Theory • Anomalies in the History of Relativity • The Einstein Myth and the Ives Papers • Axis Calibration: The Thing Einstein Forgot • Consequences of the Null Result of the Michelson-Morley Experiment • Accusations of Anti-Semitism as a Barrier to Progress in Physics • The Eternally Valid Concepts in Einstein's Work • The Philosophical Background to Einstein's Search for a Unified Field Theory • Dayton Miller's Ether-Drift Experiments • The Bush/Cheney Energy Plan

New Energy Times Archive

**Contact Infinite Energy Magazine to request our complete catalog of books and tapes.**

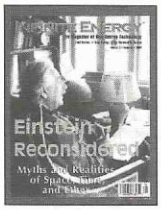
**Cold Fusion Technology, Inc.**
**P.O. Box 2816**
**Concord, NH 03302-2816**
**Phone: 603-228-4516**
**Fax: 603-224-5975**
**http:// www.infinite-energy.com**

**See products on inside back cover.**

| | North America | Foreign |
|---|---|---|
| Cold Fusion Fire From Water Video | $34.95_____ | $44.95_____ |
| Excess Heat (Paperback) | $29.95_____ | $34.95_____ |
| (Hardback) | $39.95_____ | $46.95_____ |
| Fire From Ice (Paperback) | $25.95_____ | $29.95_____ |
| Nuclear Transmutation (Hardback) | $32.95_____ | $39.95_____ |
| **Nuclear Transmutation—*Sale* (torn dust jackets)** | $10.00_____ | $15.00_____ |
| T-Shirt | $16.95_____ | $21.95_____ |
| Coffee Cup, Infinite Energy | $12.95_____ | $18.95_____ |
| Coffee Cup, Wright Brothers | $ 9.95_____ | $15.95_____ |
| TOTAL: | _____ | _____ |

**TO SUBSCRIBE OR RENEW INFINITE ENERGY MAGAZINE COMPLETE INFORMATION BELOW.**

Name:_____
Address:_____
Address:_____
City:_____ State:_____ Postal Code/Zip:_____
Country:_____ Phone:_____ Fax:_____
If using Credit Card: Check one: MasterCard ____ Visa___ American Express____



(ISSN 1081-6372)

Card Number: _____
Expiration Date: _____ Signature_____
E-Mail address_____

Subscriptions are $29.95 North America/$49.95 Foreign for six issues per year.
Any six single back issues $29.95/$49.95. Single Issues $5.95/$10.00.
Special Double Issues $10.00/$15.00. Price includes First Class/Airmail shipping.

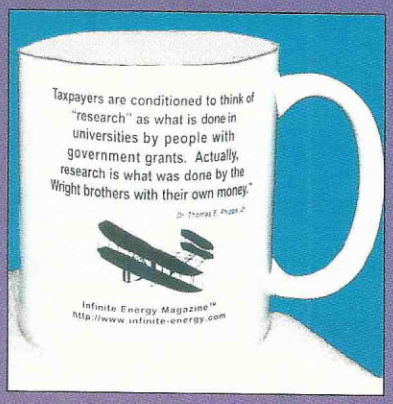
| QUANTITY | PRODUCT | PRICE NORTH AMERICA | PRICE FOREIGN |
|---|---|---|---|
| | NEW Subscription — Start at Issue No. | | |
| | RENEW Subscription — Start at Issue No. | | |
| | Single Back Issue(s) No. | | |
| | Double Back Issue(s) No. | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | TOTAL | | |

Now in its seventh year, *Infinite Energy* Magazine is distributed to U.S. and Canadian newsstands. *Infinite Energy* is circulated around the world in forty countries. Typical 2000 press run was 5,000 copies/issue. It is a technical magazine with outreach to the general public as well. To maintain the highest editorial standards, it is written and edited by scientists, engineers, and expert journalists. It is aimed at pioneering scientists, engineers, industrialists, and investors who are entering an exciting R&D area.

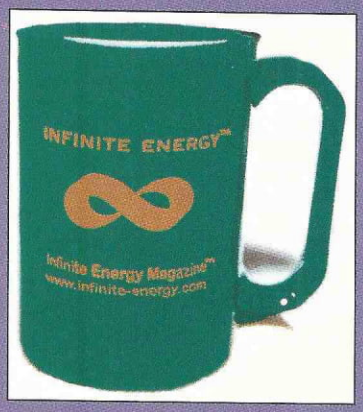
This area continues to grow explosively, with significant involvement by corporations and institutions in the U.S., Japan, France, Italy, India, Russia, and China. *Infinite Energy* reports on new technology developments and scientific discoveries as they are made.

New Energy Times Archive

# Coffee Cups Make Great Gifts!




**12 oz. Coffee Cup**
with Dr. Thomas E. Phipps Quote*
$9.95 North America/$15.95 Foreign

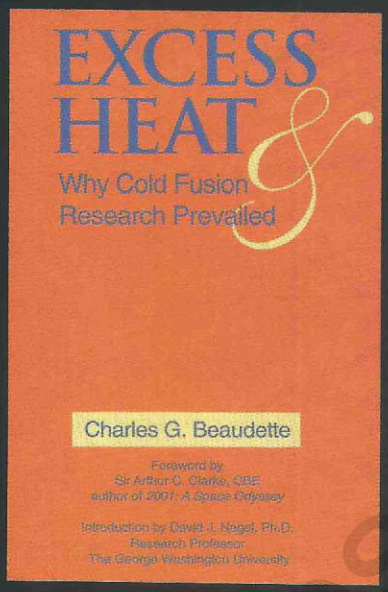



**11 oz. *Infinite Energy* Coffee Cup**
$12.95 North America/$18.95 Foreign
Tall cup, Metallic gold lettering.
*Infinite Energy* magazine and symbol.

**T-Shirt** also available with Phipps quote.* White Only, (L or XL), black text
$16.95 North America/$21.95 Foreign

*Phipps Quote on T-shirt and white mug: "Taxpayers are conditioned to think of 'research' as what is done in universities by people with government grants. Actually, research is what was done by the Wright brothers with their own money."
—*Dr. Thomas E. Phipps, Jr.*

# Add These Cold Fusion Books to Your Library Now!




NEW

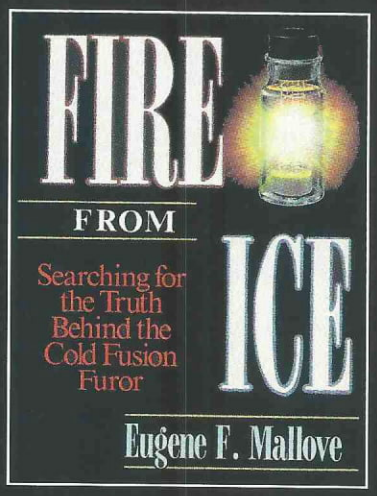
***Excess Heat***
An investigative report of the cold fusion field from 1989 to the present.

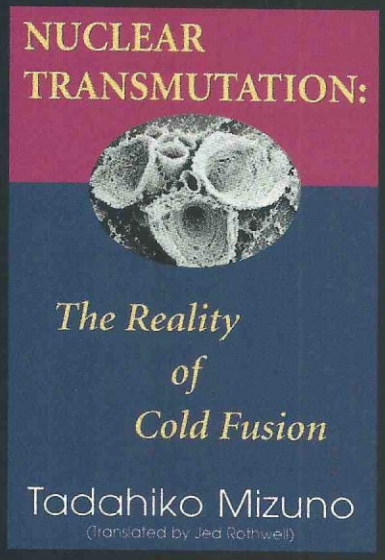
Oak Grove Press, Publisher
Infinite Energy, Distributor
May 2000, 360 pp.
Hardback $39.95/$46.95
Paperback $29.95/$34.95

(See Issue #32 for Book Review)

***Fire From Ice***
Dr. Mallove's Pulitzer-nominated book details the events surrounding and following the 1989 Pons and Fleischmann announcement.

Reprint of 1991 Edition
338 pp. Paperback
$25.95/$29.95



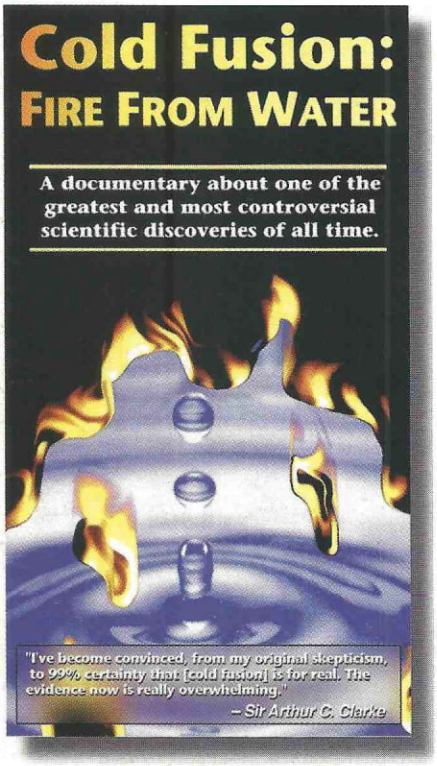




***Nuclear Transmutation: The Reality of Cold Fusion***
*Dr. Mizuno's groundbreaking book on cold fusion provides an illuminating account of one researcher's experience in this controversial field.*

December 1998
151 pp. Hardback
$32.95/$39.95

**Contact Infinite Energy Magazine. Order form on page 72.**
**All Prices Include Shipping and Handling**

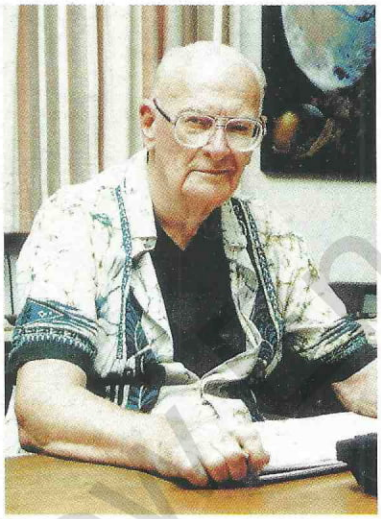
# Cold Fusion:
# Fire From Water




This informative documentary, produced in 1999, is narrated by James "Scotty" Doohan (of "Star Trek"). It features cold fusion scientists from around the world discussing cold fusion history and current research. Find out what has happened in the cold fusion field since the Utah announcement by Pons and Fleischmann in March 1989.

**$34.95 North America**
**$44.95 Foreign**

VHS (NTSC or PAL format)



"It could be the end of the fossil fuel age: the end of oil and coal. And the end, incidentally, of many of our worries about global pollution and global warming."

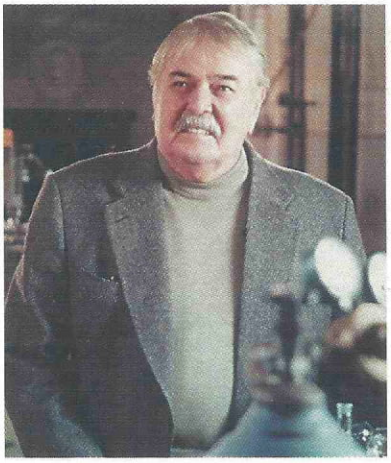
–Sir Arthur C. Clarke

Scientists featured in this documentary:

Dr. Jean-Paul Biberian • Prof. John O'M. Bockris
Dr. Benjamin F. Bush • Prof. Robert T. Bush
Dr. Les Case • Sir Arthur C. Clarke
Dr. Thomas Claytor • Dr. Martin Fleischmann
Dr. Lou Furlong • Prof. Peter Hagelstein
Dr. John Huizenga • Prof. Nathan Lewis
Sir John Maddox • Dr. Eugene F. Mallove
Dr. Douglas Morrison • Dr. Keith H. Johnson
Dr. Yan R. Kucherov • Prof. Xing Zhong Li
Dr. Melvin Miles • Dr. George Miley
Dr. Randell Mills • Prof. Richard A. Oriani
Dr. Thomas Passell • Dr. James Patterson
Dr. Stanley Pons • Robert Shaubach
Dr. Mahadeva Srinivasan • Roger Stringham
Dr. Edmund Storms • Prof. J.P. Vigier

Narrator: James Doohan

Writers: Dr. Eugene F. Mallove and Jed Rothwell
Producer/Director:
Christopher Toussaint (Free Spirit Productions)



**Send payment via check, credit card (VISA, MC or AMEX), or money order to:**

**Cold Fusion Technology, Inc. • P.O. Box 2816 • Concord, NH 03302-2816 • Tel: 603-228-4516 • Fax: 603-224-5975**

**http://www.infinite-energy.com**

New Energy Times Archive